THE ARCHITECT & BUILDING NEWS

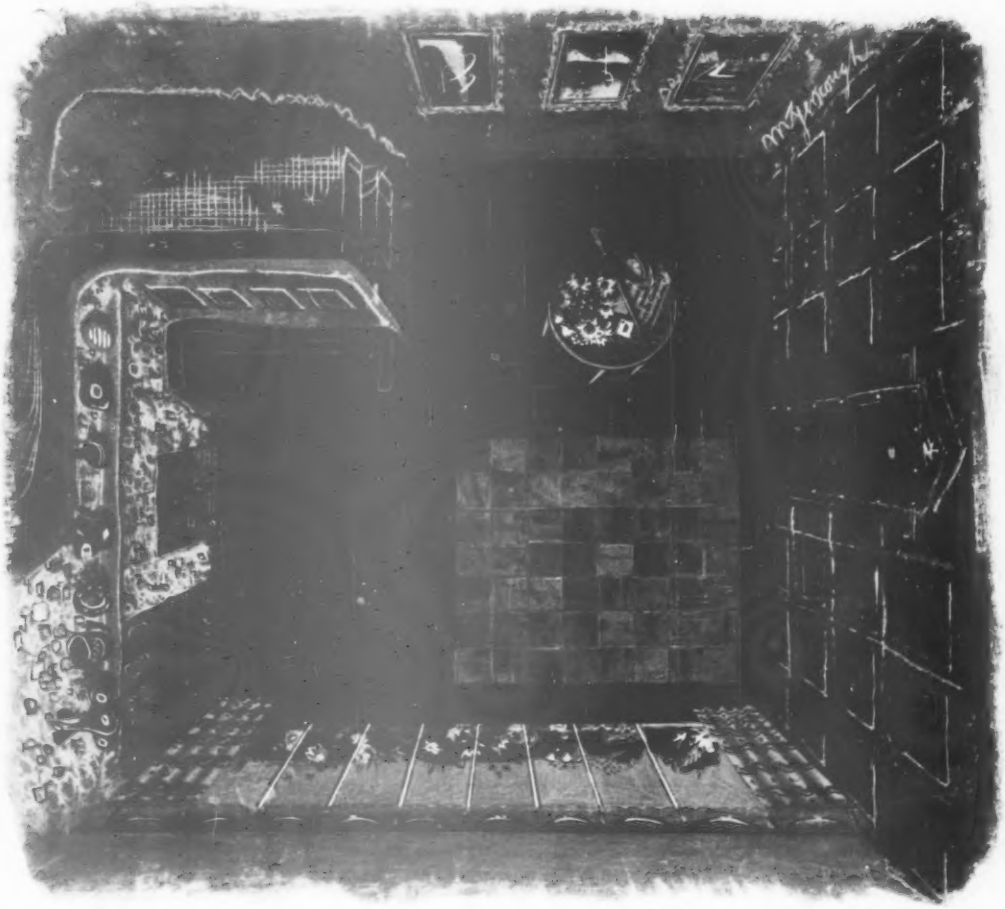
NEW YEAR DOUBLE NUMBER

PASSFIELD FLATS, LEWISHAM

TWO COLLEGES OF FURTHER EDUCATION

50 YEARS OF TECHNICAL DEVELOPMENT

JANUARY 19, 1951 · VOL 199 · NO 4283 · ONE SHILLING WEEKLY



Design for a Hall. *From the original Collage by* R. MYERSCOUGH-WALKER.

BIRD'S-EYE VIEW of an unusual scheme designed by R. Myerscough-Walker in Marley Floor Tiles. An entrancing conception such as this is not an everyday occurrence, but the laying of Marley Floor Tiles certainly is—over 100 million are now in use because of their economy in first cost, comfort, durability and cheerful good looks.

Cock o' the walk

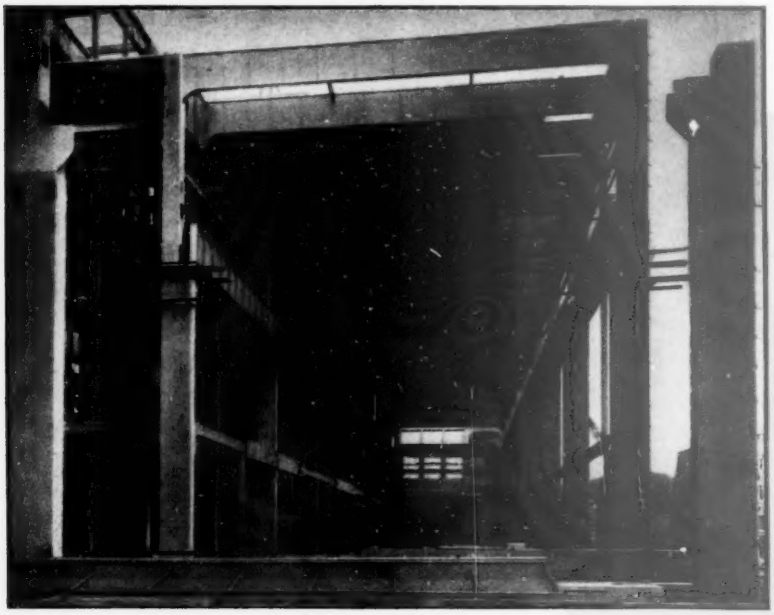
The Marley Tile Company Limited, London Rd., Sevenoaks, Kent. Sevenoaks 2251-8 MARLEY

HIGGS AND HILL
LIMITED

LONDON

LEEDS COVENTRY

THE VERSATILITY OF STEELWORK

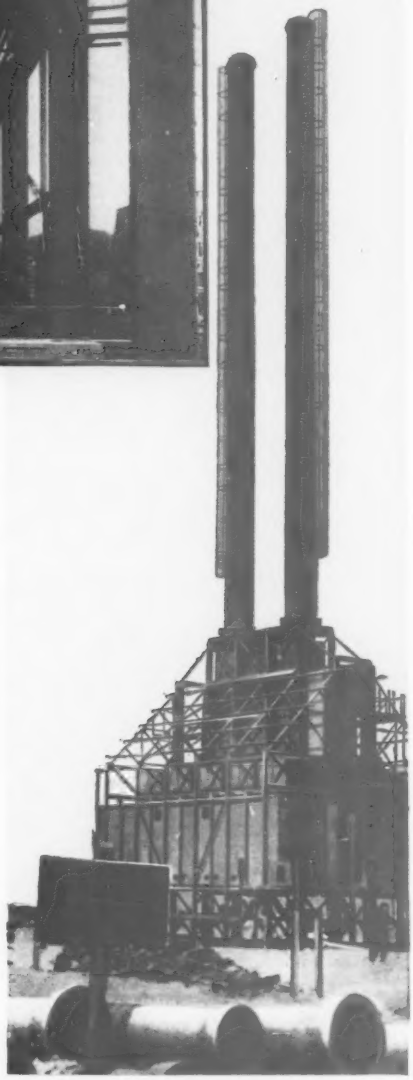


Power

A generating station is a complex structure which has to support heavy loads, permit assembly of cumbersome components, lend itself to modification or extension and, above all, remain a stable structure in the face of many conflicting factors.

It is significant of the strength and security of steelwork, that, almost without exception, steam power stations are always of steel-framed construction.

The lower illustration shows a link in another power chain; the furnace structure of a chemical plant. This weighs 130 tons and is chiefly of welded construction.



STEEL STRENGTH SECURITY

B·C·S·A

BRITISH CONSTRUCTIONAL STEELWORK ASSOCIATION
ARTILLERY HOUSE, WESTMINSTER, S.W.1

BY APPOINTMENT PAINT AND WATER PAINT MANUFACTURERS TO H.M. THE KING

Rooms of distinction with their quiet dignity and charm, attributable to simplicity of setting, owe much to the use of Walpamur Quality Paints.

THE WALPAMUR CO LTD • DARWEN AND LONDON

RICHMOND CLUB

Exterior decorations by:
Martin & Thorpe, Richmond, Surrey

CERRUX
for Decoration and Protection

Where exceptional durability is to be coupled with high decorative value CERRUX DECORATIVE PAINTS are an obvious choice . . .

A few of the many important contracts carried out during 1950 using CERRUX DECORATIVE PAINTS:

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LANSDOWNE CLUB, Berkeley Square, London, W.1
Contractors: Interior & Structural Cleaners Ltd., London, W.C.2

SPROWSTON INFANTS SCHOOL, Norwich, Norfolk
Contractors: F. P. Goodey & Sons, Norwich

HELLESDON HOSPITAL, Norwich, Norfolk
Contractors: Tickner & Sons, Sprowston

WARRIOR HOUSE HOTEL, St. Leonards-on-Sea, Sussex
Contractors: Maintenance Staff

GORLESTON-ON-SEA HOLIDAY CAMP, Norfolk
Contractors: E. Moore & Son, Great Yarmouth

IMPERIAL HOTEL, St. Helier, Jersey, Channel Islands
Contractors: Cranwell Construction Co. (Jersey) Ltd. St. Helier

SPECIFY CERRUX FOR 1951

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So many and so varied are the trades and commodities employed in the erection of modern buildings, that up to date information expressed in clear and straightforward form is the most pressing need of the present day architect.

The District Engineers who represent this Company have a wide practical and technical experience, coupled with an encyclopædic knowledge of todays regulations and standards as applied to the Electrical Equipment of Buildings.

Contact with members of the profession is only made by invitation, or when information is to be sought or imparted, valuable time not being wasted in platitudes nor visits of a nebulous character.

SANDERS
WEDNESBURY

MAKERS OF GOOD SWITCHGEAR FOR OVER FIFTY YEARS

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.

The opening of the reconstructed House of Commons on October 26 was a landmark in the long and distinguished history of the Mother of Parliaments. But it can fairly be said that it was also a great occasion in the splendid history of Dunlopillo, the original Latex Foam cushioning. For every foot of seating through the length and breadth of the historic building was upholstered with this superb material.

The Speaker's Chair and all the seating, not only in the Chamber but throughout the galleries and lobbies, 1622 feet of it, is cushioned with Dunlopillo. In the precincts the story is the same. Every article of upholstered furniture in the conference rooms, writing rooms and offices, in the Prime Minister's own room, in the dining rooms—even the stools in the phone boxes—all are upholstered in Dunlopillo.

The Speaker's Chair

The Conference Room

One of the Ministers' Rooms

"The time has come, . . . to talk of many things! of shoes — and ships — and sealing wax — of cabbages — and kings:"

As soon as we touch upon the diverse uses of Expanded Metal we, like Lewis Carroll's Walrus, cannot help but 'talk of many things' because . . . .

The Keynote of Expanded Metal is

Adaptability

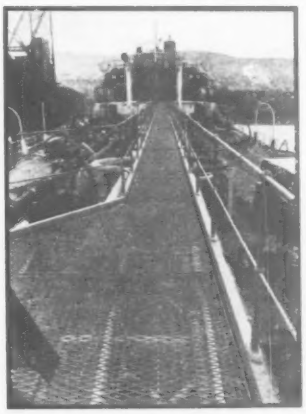
It is universally used as reinforcement for concrete or lathing for plasterwork and yet it is equally successful as a decorative ceiling of colour-anodised Expanded Aluminium. From walkways to letter trays; reinforcement to decor; open-work partitions to loudspeaker grilles; bedlamps to guards for machinery — such diversity of use provides evidence of the hundred and one ways in which men take advantage of the remarkable *adaptability* of Expanded Metal.

TATE GALLERY, LONDON

(*Above*): Expanded Metal lathing and plaster ceilings at the Duveen Sculpture Galleries. Architects: Messrs. Romaine-Walker & Jenkins, A.F.R.I.B.A., London, in collaboration with the late Mr. John Russell Pope, Consulting Engineers: Messrs. Reade, Jackson & Parry, London.

(*Below*): Expanded Metal fore and aft gangways on M.T. "Waziristan", built by Lithgows Ltd., Port Glasgow.

THE M.T. "WAZIRISTAN"



Expanded Metal Products

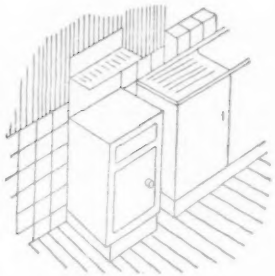
'EXPAMET'

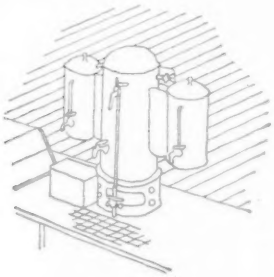
The Expanded Metal Company, Limited

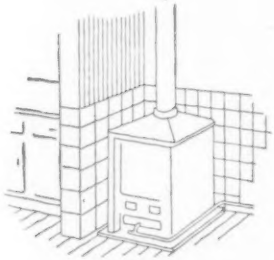
Burwood House, Caxton Street, S.W.1 WHitehall 1736.

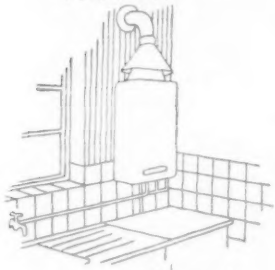
STRANTON WORKS, WEST HARTLEPOOL. HARTLEPOOLS 2191.

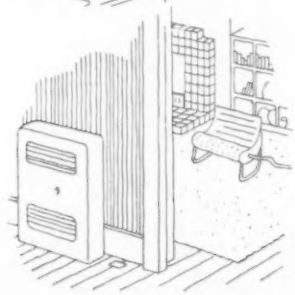
ALSO AT: ABERDEEN. BELFAST. BIRMINGHAM. CAMBRIDGE. CARDIFF. EXETER. GLASGOW. LEEDS. MANCHESTER











Information and advice on GAS equipment

In order that architects, builders and others interested may keep abreast of the latest developments in gas services, a permanent exhibit is maintained at the London Building Centre. Here may be seen examples of the following types of appliances :—

DOMESTIC GAS COOKER

Various well-known cookers are exhibited, all of a high standard of design and performance.

CATERING EQUIPMENT

Included in this part of the exhibit is equipment for snack bar counters, refuse disposal, vegetable boiling, grilling, roasting and steaming.

CENTRAL AND WATER HEATING

Coke and gas-fired boilers are included, as well as hot water circulators, bath heaters, sink heaters, and multipoint heaters.

SPACE HEATERS

Appliances include coke fires with back boilers, gas radiators, panel fires, hearth fires, portable gas heaters, and overhead radiant heaters.

HOME LAUNDRY EQUIPMENT

Under this heading are exhibited appliances for drying and airing towels, clothes drying (both built-in and free-standing), and various types of clothes washing machines.

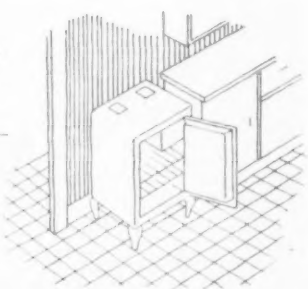
REFRIGERATORS

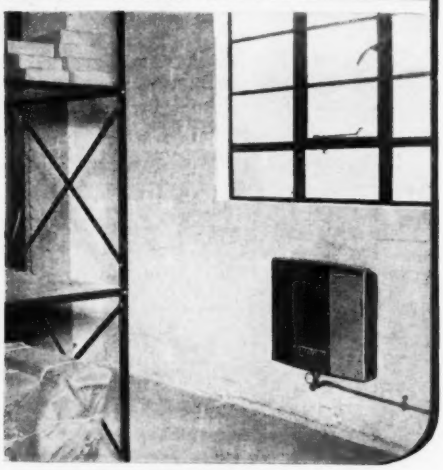
Both built-in and free-standing types are included.

A technical assistant is in attendance at the Building Centre to give information and advice. Literature dealing with the application of gas appliances to a great variety of problems may also be obtained from the Area Gas Boards or the Gas Council.

GAS

ISSUED BY THE GAS COUNCIL, 1 GROSVENOR PLACE, LONDON, S.W.1. Tel: SLOANE 4554

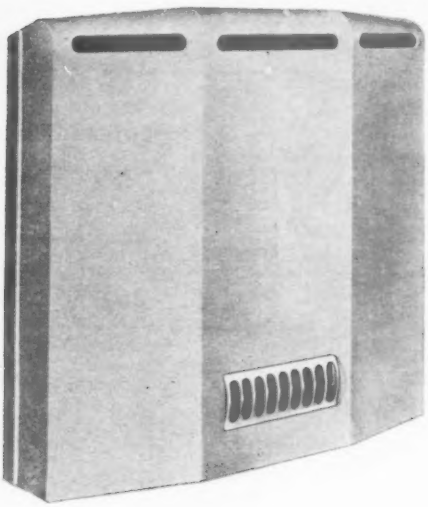




THE

"Sapphire"

BALANCED FLUE SPACE HEATER



Full information upon request from

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CERTIFIED PERFORMANCE

"PLIMBERITE" FOR SUSPENDED FLOORS

Building Research Station Tests Prove Strength of "Plimberite" as Flooring.

The summary quoted below heads the report of a special investigation on the behaviour of ¾" "Plimberite" (standard grade) under static and impact loading.

"¾ in. "Plimberite" board, made from wood chips and synthetic resin, has been tested under vertical static and impact loads when nailed over timber joists at 16 in. centres.

In the tests the board sustained no damage when subjected to an applied load up to 100 lb./square foot and at this load the deflection of the board relative to the joists was slightly less than 1/20. in.

Damage under standard impacts used for checking house floors was slight and, provided that the board is supported and nailed at all edges, it can be regarded as satisfactory for houses and probably also for offices."

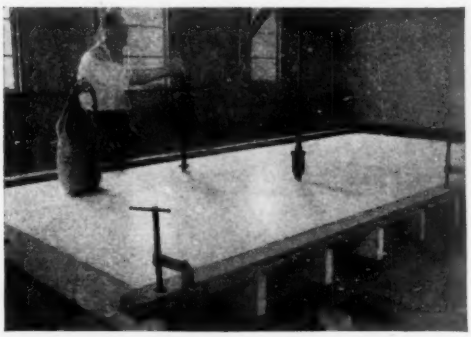


Fig. 1. - Rig and Gear for applying impact tests.

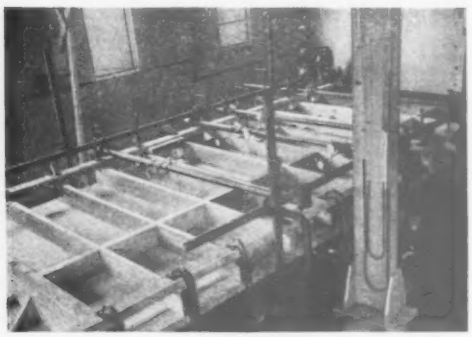


Fig. 2. - Rig for static loading tests. (Floor section is inverted, with captive airbag beneath for loading.)

Use "PLIMBERITE" also for:

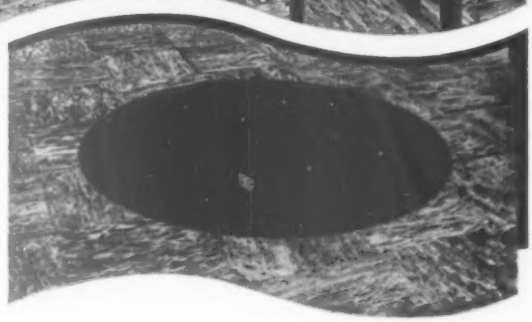
Partitions
Wall cladding
Roof Lining
Notice boards
Shelves
Door panels
Skirting boards
Built-in furniture units, etc.

"PLIMBERITE" can be worked using normal woodworking tools and techniques and is available in sizes 8 ft. by 4 ft.

A copy of the full report on the special investigation by the Building Research Station may be obtained by Qualified Architects, Builders, etc., on request to

BRITISH PLIMBER LIMITED

20 ALBERT EMBANKMENT, LONDON, S.E.11. **Tel. RELiance 4242**



FUNCTIONAL *Beauty*

This office at the Doncaster Co-operative Society is a picture of functional beauty. In no small measure this is due to the attractive colour and subtle design of its Dunlop Rubber Flooring. But the picture cannot show the quiet, the resilience and the long-lasting wear that Dunlop Rubber Flooring provides. Today more and more Dunlop Rubber Flooring is being installed.

In the hands of the craftsmen of the Dunlop Rubber Installation Service, the 46 plain and marbled shades can lend beauty as unique as it is durable. Monograms and special patterns (see inset) can be made to any design: Dunlop designers will be pleased to assist. Full details of the product and service may be obtained at any of the addresses below.

DUNLOP RUBBER FLOORING

DUNLOP RUBBER COMPANY LTD., CAMBRIDGE STREET, MANCHESTER

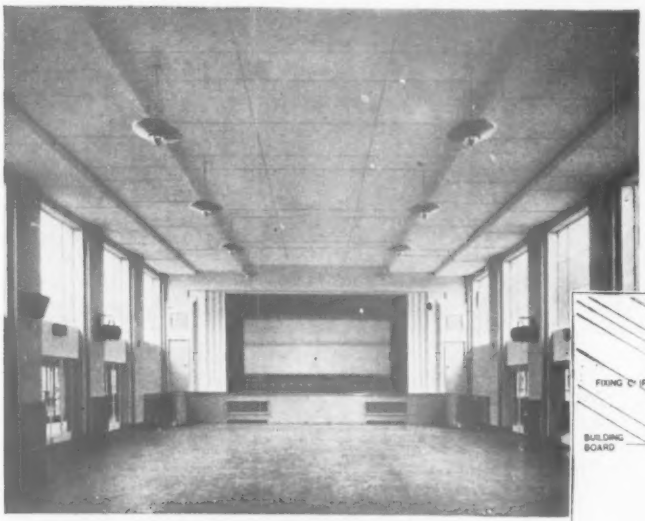
LONDON: Clerkenwell House, Clerkenwell Green, E.C.1. GLASGOW: Dunlop Rubber Co. (Scotland) Ltd., 46/78, North Wallace Street, C.4. LIVERPOOL: 24, Cornhill, Park Lane, Liverpool 1. BIRMINGHAM: Dunlop House, Livery Street, Birmingham.

50G/RF.3

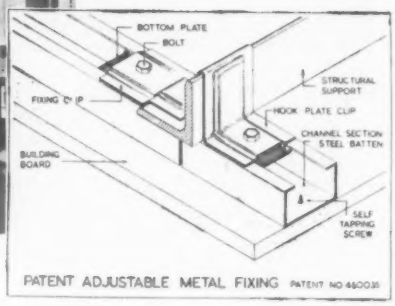
TENTEST

ADJUSTABLE METAL FIXING

IN SCHOOLS



A ceiling in ½" Insulating Board fixed by TenTesT Adjustable Metal Fixing



STANLEY PRIMARY SCHOOL, MARTON, BLACKPOOL
Architect :—Arthur Hamilton, A.R.I.B.A. Borough Surveyor, Blackpool.
Contractor:—R. Fielding & Son.

There has been a continuous demand for this TenTesT System of fixing Suspended Ceilings for more than 15 years, and it is being still more widely used for Schools and similar buildings; indeed, we have received orders during the last twelve months for tens of thousands of yards.

The reason for this continued demand is the essential soundness of the method. The channel section supports are bolted together to form a rigid framework which is fixed to the structural members by stout clips, no drilling of structural members being required. The board is then screwed up to this framework by Cadmium plated self-tapping screws and is therefore held securely against movement which might open the joints. The screw heads can be "blinded" by stopping, and rendered invisible by subsequent decoration.

This excellent method is at YOUR disposal. It is tried and tested, and is reasonable in price because it makes a first-class job of a FLAT (non-sag) ceiling with no strips showing.

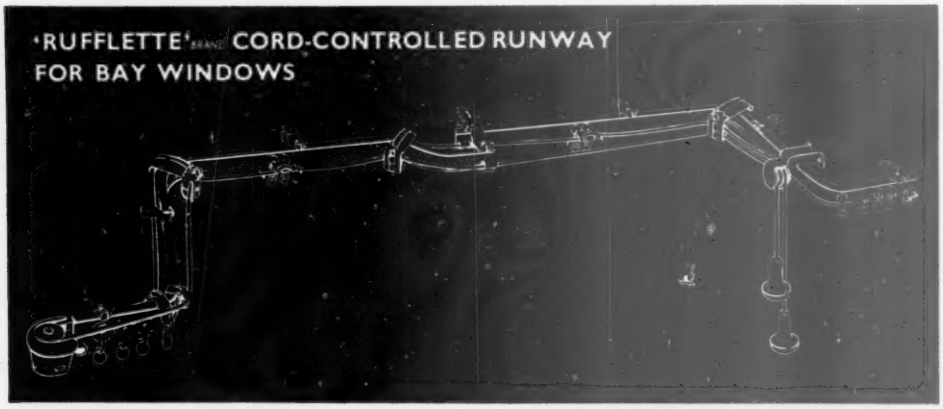
May we send you full particulars or get our representative to call?

TENTEST TRADE MARK *Made in Canada*

TENTEST FIBRE BOARD CO. LTD., SPECIALISED CONSTRUCTION DEPARTMENT,
75, CRESCENT WEST, HADLEY WOOD, BARNET, HERTS. Tel.: BARnet 5501 (5 lines). 'Grams: Fiboard, Norphone, London.

Specify 'Rufflette' BRAND Runway

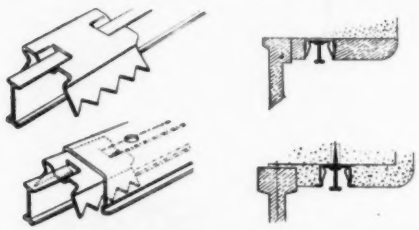
a complete and specialised range of curtain suspension systems



'RUFFLETTE' BRAND RUNWAY FOR STRAIGHT WINDOWS

★ For smooth and trouble-free operation specify 'Rufflette' brand cord-controlled Curtain Runway. It is recommended for use in large establishments, hotels, offices and residences where curtain can be controlled without handling. Available for bay as well as straight windows.

'RUFFLETTE' BRAND RECESSED (BUILT-IN) CURTAIN RUNWAY



'Rufflette' brand Recessed Curtain Runway is a permanent and integral part of building construction. It is inexpensive and can be fitted into wood or plastered lintels. The runway is held rigidly in position by a patent spring clip without screws and is a concealed and a permanent fitting.

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BY

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REINFORCED CONCRETE SPECIALISTS

GREEN LANE — PRINCESS STREET

PHONES ARDWICK 1962, 4095.

MANCHESTER 1

GRAMS MONOLITHIC

The artist Artur Horowitz recorded this impression of the tool-room at the Reliance Works, Chester for Williams & Williams Limited.

You can see them at eight o'clock in the morning
entering the tool-room of the £1,000,000
window-making plant of Williams & Williams at Chester:
they are the engineers whose job is to make
good windows better. These men
produce prototypes for new windows, make jigs
and tools, gear their "know how" to all
projects and plans to improve metal windows
and window-making. They pass on to
the building industry the benefits of every advance
in the technique of window-making.
Architects who specify Williams & Williams windows
are faithfully served by these men.

WILLIAMS & WILLIAMS

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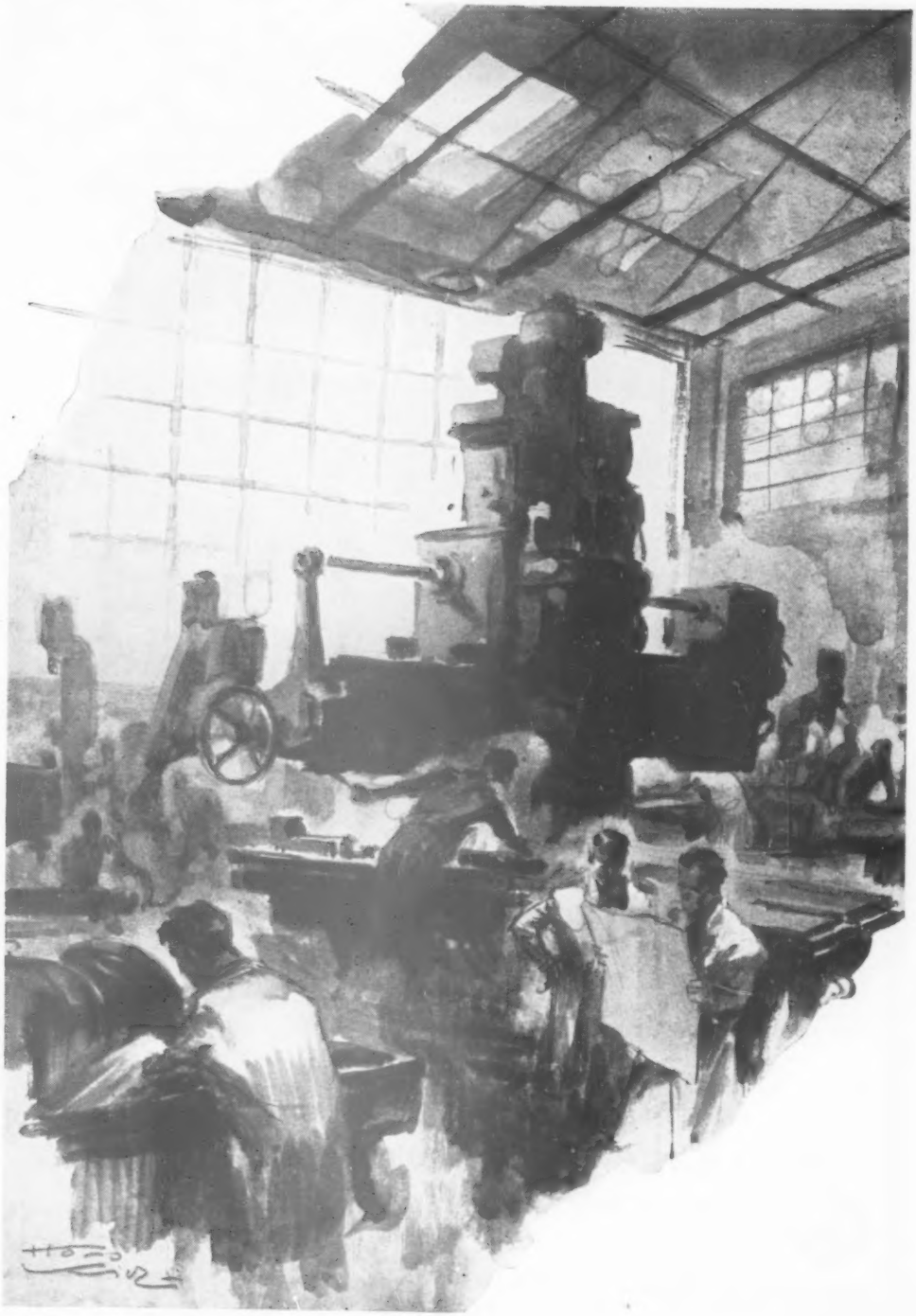
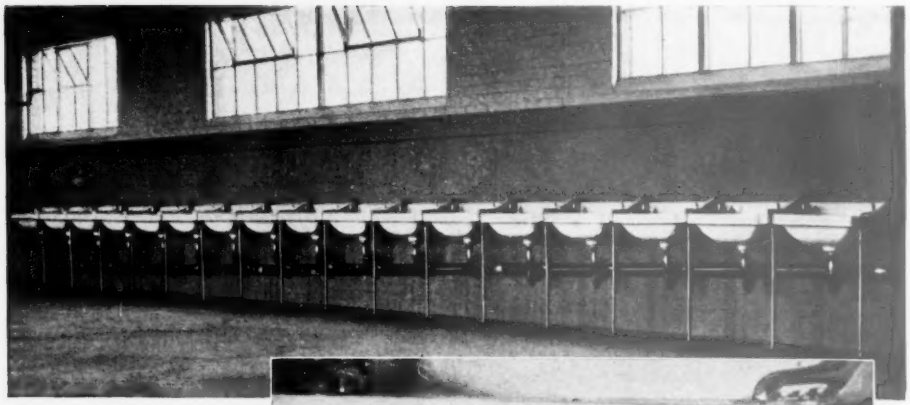
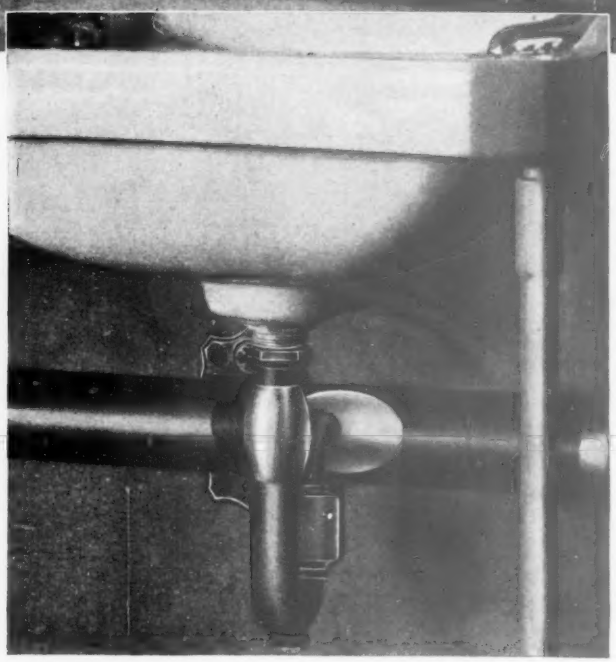
RELIANCE WORKS · CHESTER







LEAD PLUMBING IN A FACTORY-

A current example

The waste piping for this range of 17 lavatory basins has been simplified by the use of patent lead anti-syphonage traps, which are permitted to be used in place of anti-syphonage pipes, by some authorities, in special circumstances. The main $2\frac{1}{2}$" lead waste branch was prepared in four units with traps jointed on and completed in position with three wiped running joints. The flexibility of the lead permits easy *in situ* adjustment for quick and accurate connecting up to the ceramic basins without strain. The finished job is neat and clean, an excellent example of permanent plumbing in L E A D.

h

THERE IS NO SUBSTITUTE FOR LEAD

now in plentiful supply

LEAD

The Technical Information Bureau of the Lead Industries Development Council, which exists to give assistance on problems relating to the use of lead sheet and pipe in building work, will be pleased to give advice on any questions relating to the uses of the materials.

LEAD INDUSTRIES DEVELOPMENT COUNCIL, EAGLE HOUSE, JERMYN STREET, LONDON, S.W.1

LEAD TECHNICAL INFORMATION BUREAU, 90, EBURY STREET, LONDON, S.W.1. TELEPHONE: SLOANE 0474.

B/57/11/50

S-W.605

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Write for full details and a demonstration

The Simplex Brick Truck . . Price £12.0.0

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FAGGS ROAD, FELTHAM, MIDDLESEX **Telephone : Feltham 4057 and 4058**

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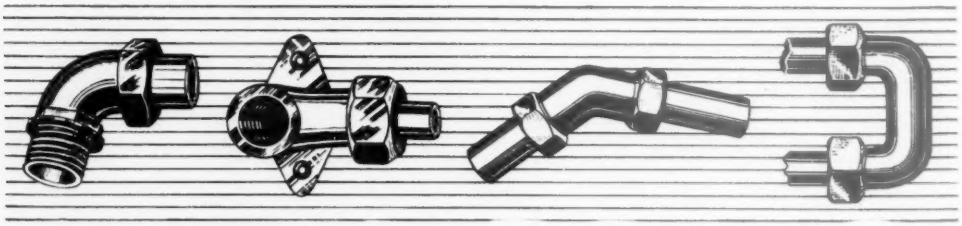
Kontite contracts include . . .

Bank of England (left)—Cliff Quay Generating Station, Ipswich.
Bradford Infirmary—Staythorpe Power Station, Nr. Newark on Trent.
Princess Elizabeth Hospital, Guernsey—Newstead Sanatorium, Notts.
Southern General Hospital, Glasgow—Castle Harbour Hotel, Bermuda.



Kontite COMPRESSION *fittings*

Telephone : BOLTON 197. Grams : KONTITE, BOLTON.
LONDON OFFICE : 36 VICTORIA STREET, S.W.1.
Tel. : Abbey 2144. 'Grams : Kontite, Sowest, London.

KAY & CO. (Engineers) LTD., Bolton Brass Works, BOLTON.

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NIC-O-LOID Emulsion Paint

THE TEN STAR PRODUCT

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* **Dries Without Brush Marks however carelessly applied.**
* **Can be Re-coated if necessary within one hour.**
* **Can be Used on all Wall Surfaces including New Cement, Plaster and Asbestos.**
* **Highly Suitable for External and Internal Work.**
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* **Freedom from Odour.**
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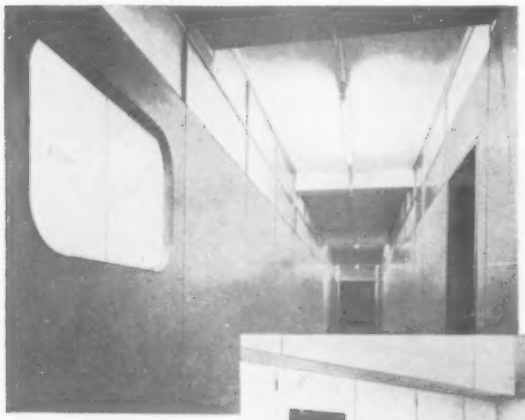

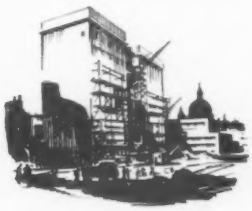

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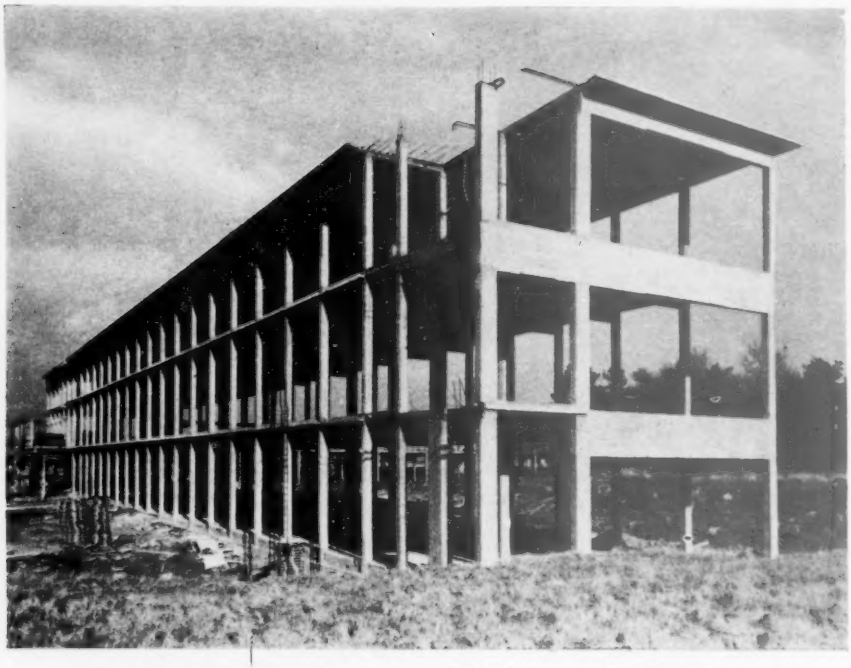

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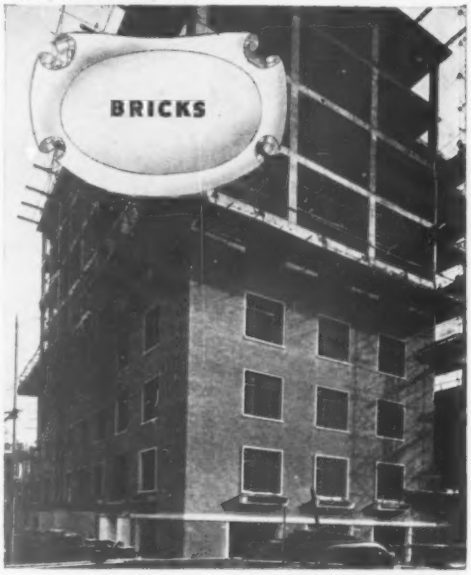

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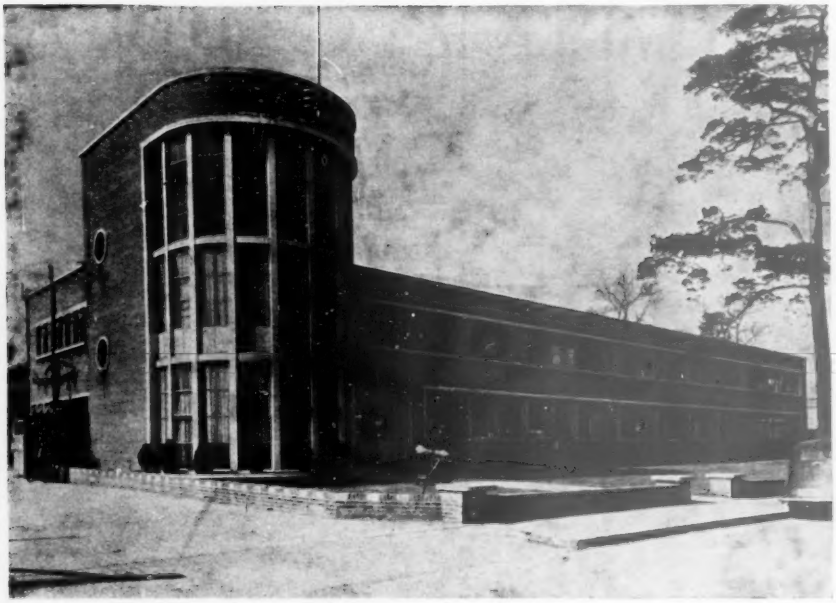

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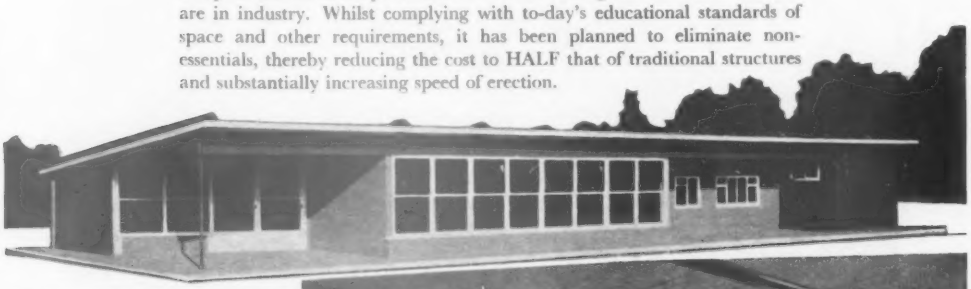

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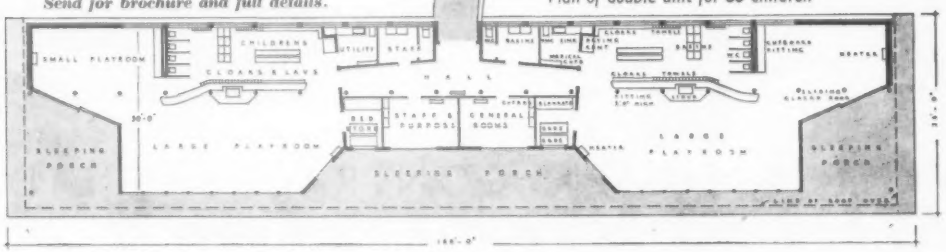

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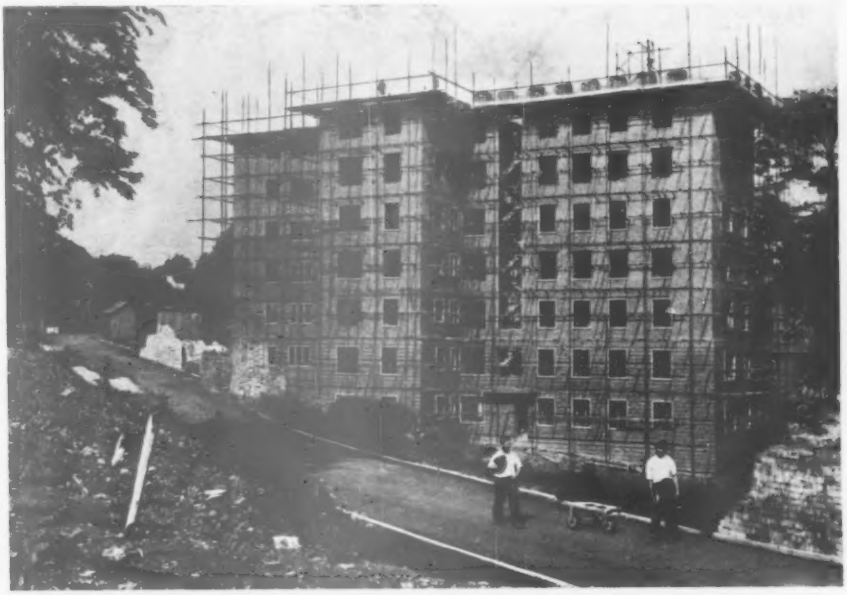

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THE ARCHITECT & BUILDING NEWS

January 19, 1951.

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MIDWAY THROUGH THE XXTH CENTURY

A brief survey of the development of modern architecture in England during the first half of the century, illustrated by photographs taken, with a few exceptions, during the end of last year.

THE PASTURES, Nr. LUFFENHAM, RUTLAND. C. F. A. VOYSEY, 1901

ANY attempt to survey the development of modern architecture in England over the first half of the 20th Century in a small space is bound to omit much of importance, and this short article must be regarded merely as a brief reminder of some of the more important events and buildings during the early days of modern architecture in this country. The photographs, some of which were taken recently, are intended to amplify the text, and remind readers of some of the earlier examples of modern architecture in England.

1900-1924. The first quarter of the 20th Century showed little architectural development in Great Britain but a new spirit was already abroad in the world. The development of reinforced concrete in France and its use in building construction by Auguste Perret and Freyssinet, together with the development of the structural steel frame, showed the possibilities of the new structural techniques. In Germany Peter Behrens built the new Turbo Factory in Berlin (1909), in the same year as the Selfridge building in Oxford Street was erected. In this period Gropius and Le Corbusier began their work which was to influence architectural development throughout the world. Gropius was appointed as director of the Weimar Art School, 1919. In England the first steel framed building was erected, the Ritz Hotel, Piccadilly (1906), and the Design in Industry Association was founded (1915). The end of the first world war (1914-1918) gave the new architecture its chance on the Continent, but in England the development moved at a slower pace. Architects like C. F. A. Voysey (1857-1941) carried on the William Morris philosophy of a free traditionalism in design, primarily in relation to domestic architecture, one of the best examples being the Pastures, Nr. Luffenham, Rutland (1901). Although little architectural development occurred in England in this period other developments took place both in England and abroad which ultimately had a considerable influence on architecture. The first Town and Country Planning Act in England was passed in 1909, and in 1919 the Ministry of Health was formed, taking over the powers of the Local Government Board. In 1902 the first goods carrying motor vehicles were produced by Napiers and by 1925 the year's output of vehicles had risen to 167,000 (132,000 cars and cabs). In 1900 the first Zeppelin airship was tested over Lake Constance; in 1903 the Wright Brothers made the first power driven flight in the world in a heavier than air machine; in 1914 Britain won the Schneider Trophy Air Race at a speed of 55.3 m.p.h.; in 1919 Alcock and Brown made the first non-stop air crossing of the Atlantic; and in 1925 Sir Alan Cobham flew 17,000 miles to S. Africa, while America won the Schneider Trophy Race at a speed of 232.57 m.p.h.

1925-1929. The first "modern" building in this country was a small house, New Ways in Northampton designed by Peter

Behrens (1926); this was followed by a group of houses at Silver End, Essex, by Thomas Tait, High and Over, Amersham (1929) by Amyas Connell, and William Crawford's offices, High Holborn London, by Frederick Etchells & Welch (1930). Most of these early English modern buildings were simple, flat roofed buildings with large window areas, white rendered walls, and an absence of eaves overhangs and projecting window cills. Generally, they have not weathered too well, for while Continental architects had already discovered the need for special treatments on canopies, eaves, copings and cills these lessons had not yet been learned in this country. The Silver End houses introduced the horizontal paned metal window, and the corner window to English domestic architecture, two features eagerly seized upon by later speculative builders.

1930-1934. The years 1930 to 1934 showed a rapid growth of modern architecture in this country, in 1931 the M.A.R.S. group was founded as the English Branch of C.I.A.M. In this year the Boots Factory, Beeston, was designed by Owen Williams; George Checkley built the White House, Cambridge; and Burnett, Tait and Lorne built the Royal Masonic Hospital, Ravenscourt Park. 1932 saw the completion of the Shakespeare Memorial Theatre, Stratford, won in open competition by Elizabeth Scott, the R.I.B.A. Building in Portland Place by Grey Wornum, and the *Daily Express* Building, Fleet Street, by Ellis and Clarke. Frank Pick, the General Manager of the London Passenger Transport Board, appointed Charles Holden as architect for the new Underground railway stations required in connection with the extensions of the Underground system, and one of the best examples, Arnos Grove, was completed in 1932. Other important buildings included Thursoe House, Cambridge, George Checkley (1932). A reinforced concrete house, Wrotham, Kent, Colin Lucas (1933); Universal House, Southwark Bridge, Joseph Emberton (1933); Showroom for the London Electricity Co., Victoria, Maxwell Fry (1933); New Buildings at the London Zoo, Tecton (1934-35); The Isokon Flats, Hampstead, Wells Coates (1934); The Empire Pool, Wembley, Owen Williams (1934); Fischers' Restaurant, New Bond Street, Raymond McGrath (1933).

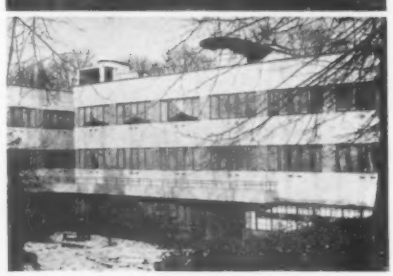
In **1927** Frederick Etchells' translation of Corbusier's book *Towards a New Architecture*, was first published in England, and the fact that important public bodies like the London Transport Board and the Royal Zoological Society were employing modern architects brought the new architecture to the attention of the general public. In 1934 two architectural competitions were held with assessors who invited a contemporary solution to the problem set in the competition. The first was the Gidea Park Housing Competition, for which designs for small houses of various sizes were required. The winners' houses were eventually built, and Architects like Tecton, F. R. S. Yorke and Stephenson, Thornton White, and Scott, Shepheard and Chesterton, were amongst the winners. These houses are still standing to-day, a curious mixture of styles, all badly maintained and standing in bleak rows as a permanent warning to promoters of Exhibitions who lack the courage to demolish their buildings after their period of exhibition is over. The idea of the competition and exhibition was to popularize modern architecture among the ordinary house purchaser who had only a very limited amount of money available. Although the exhibition was well attended, it would be interesting to learn if any of the architects concerned received other commissions as a result of the exhibition. The second competition was for the Bexhill Pavilion, this was won by Chermayeff and Mendelssohn, and will be referred to later.

ABOVE: THE R.I.B.A., GREY WORNUM, 1932; UNIVERSAL HOUSE, SOUTHWARK BRIDGE, JOSEPH EMBERTON, 1933; GIDEA PARK EXHIBITION ESTATE, 1934. BELOW: EASIWORK SHOP, TOTTENHAM COURT ROAD, RAYMOND McGRATH, 1930; FISCHER'S RESTAURANT, NEW BOND STREET, McGRATH, 1933.

ABOVE, L.-R.: STEWART AND ARDERN GARAGE, STAINES. CAMERON KIRBY, 1934. ISOKON FLATS, LAWN ROAD, HAMPSTEAD, WELLS COATES, 1934. GORILLA HOUSE, LONDON ZOO, TECTON, 1934. BELOW: SASSOON HOUSE, PECKHAM, MAXWELL FRY, 1935. PIONEER HEALTH CENTRE, PECKHAM, SIR OWEN WILLIAMS, 1935. HIGHFIELD COURT, GOLDERS GREEN, A. V. PILICHOVSKI (A. V. PILLEY), 1935.

In this period, 1930-34, modern architects began to use reinforced concrete, not only as a framing material but for monolithic construction, and some of the early examples of this type of construction were carried out by Owen Williams, Tecton, Connell and Ward, and Colin Lucas. At the same time however modern architects were beginning to consider the use of other materials such as brick (L.P.T.B. stations) and glass (Universal House and the *Daily Express* Building) as facing materials. Time has shown that these alternative materials have weathered considerably better than painted or rendered reinforced concrete.

1935-40. While the early years of the 1930's showed the beginning of the acceptance of modern architecture in England, the later years up to the outbreak of World War II in 1939, showed a gradual widening of the influence of the earlier pioneer architects. In 1935 modern buildings were still mainly confined to houses and flat schemes for enlightened individual clients. The Cement and Concrete Association organized a competition for low-rental, 5-storey flats using reinforced concrete. Lubetkin and Tecton won this competition with an outstanding scheme worked out in great detail, and the influence of this scheme can be seen in many post-war housing projects. One of the major advances in the "Tecton" scheme, over previous low-cost housing, apart from the abandoning of the Neo-Georgian style, was the individual staircase access in place of the gallery approach to the flats, similar to the Gropius Siemensstadt low-rental developments near Berlin in 1929. This competition did much to encourage the use of monolithic reinforced concrete buildings, although the Tecton design was not built. In 1935 a number of reinforced concrete blocks of flats were built mainly in and around London. Sassoon House, Peckham, Maxwell Fry; Pullman Court, Streatham, Frederick Gibberd; High Point No. 1, Highgate, Tecton; Highfield Court, Golders Green, A. V. Pilichowski. All these buildings were finished with varying forms of cement paint and in some cases too little care was taken in relation to the termination of parapets, etc., with the result that they have weathered badly and require considerable maintenance to retain their original appearance. The number of modern houses increased although difficulties were being met in many cases where Local Authorities or adjoining owners objected to a contemporary house in a particular neighbourhood. The Ruislip case in connection with a pair of concrete houses designed by Connell, Ward and Lucas, was of special importance as the design was rejected by a local panel of Architects, but after a year's wrangling the houses were built almost in accordance with the original designs. Other architects were less fortunate, in some cases the Authorities persisted with their objections, and in others the clients abandoned the project altogether. Houses built in 1935 included The Sun House, Hampstead and the Chipperfield House, both by Maxwell Fry, the latter being first rejected by the Local Authority because of its concrete construction and flat roof, but eventually built in brick and timber. Other important reinforced concrete buildings in 1935 were the Pioneer Health Centre, Peckham, Owen Williams; F. R. S. Yorke's House at Hatfield; Harding and Tecton's houses at Farnham Common and Sydenham Hill, and the Whipsnade Zoo Buildings, Lubetkin and Tecton. 1936 saw the completion of the De La Warr Pavilion, Bexhill, won earlier in competition by Chermayeff and Mendelssohn; this was one of the most successful modern build-



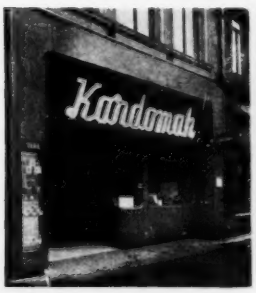
ABOVE: HIGHPOINT HIGHGATE, TECTON.
SUNHOUSE, HAMPSTEAD MAXWELL FRY.
PENGUIN POOL, LONDON ZOO, TECTON, 1935

ings erected before the second World War, and did a great deal to make modern architecture popular with the general public, who liked its clean appearance, spacious planning, and the high standard of comfort provided for its patrons. Gropius came to England in this year and his first building in conjunction with Maxwell Fry was the House in Church Street, Chelsea, adjoining a house designed by Chermayeff and Mendelssohn. These were both built in brick with a rendered finish and, in spite of the care taken in protecting vulnerable points, have weathered badly largely as a result of the failure of the rendering. Kensal House, Maxwell Fry, and Kent House, Connell, Ward and Lucas, continued the tradition of reinforced concrete low-cost flats, Kensal House being of particular interest in view of the endeavour made to create a self-contained community on a limited scale, it was the forerunner of many post-war schemes; the development included flats, a tenants' club, and a nursery school.

1936 saw the completion of the first section of Charles Holden's vast London University buildings; Simpsons, Piccadilly, Joseph Emberton; the Burlington Girls' School, Hammersmith, Burnet, Tait and Lorne; the London Gliding Club, Christopher Nicholson; the London Films Laboratories, Denham, Gropius and Fry; and a number of houses including the two bungalows at Whipsnade by Lubetkin and Tecton. Some of the first London shops by modern architects were also completed: the first Cresta Silk Shop, New Bond Street, Wells Coates; the London Shoe Co., Regent Street, by the French architect Mallet Stevens; and Threshers Ltd., Conduit Street, Gerald Lacoste. The first of the modern shops had been built by Raymond McGrath in Tottenham Court Road for Easiwork Ltd., in 1930. All of these are in excellent condition to-day, except for Threshers which has suffered considerable alteration, and their influence can be seen in every new shop front erected in the past 15 years.

The development of modern architecture led to the use of materials other than reinforced concrete both as facings, and structurally. Gropius and Fry built a delightful timber house near Sevenoaks (1937); Steel House, Tothill Street, Burnet, Tait and Lorne was faced with Portland Stone (1937). At the same time the range of modern buildings increased to include churches: John Keble Church, Mill Hill, D. F. Martin Smith (1937); Colliers Wood Methodist Church, Edward D. Mills (1937); Pubs.: The Comet, Hatfield, E. B. Musman (1937), and projects for bodies like British Railways in the form of their offices in Queensway and the Strand (1937) by Cadbury Brown. At this period, however, the Building Industry was feeling the full effects of the economic depression, the growing group of modern architects had fewer jobs. 1937 produced Gilbey's offices by Chermayeff, houses by Maxwell Fry, Raymond McGrath and Connell, Ward and Lucas, the Olympia Garage, Joseph Emberton. In 1938, Munich and the threat of war, the principal buildings of this year had one thing in common, with the exception of Roche Products Factory, Welwyn, Prof. Salvisberg and C. S. Brown, namely, a break away from the paint finished reinforced concrete buildings of earlier years; Tecton's Finsbury Health Centre was faced mainly with glass and tiles; Maxwell Fry's flats at Ladbroke Grove were reinforced concrete framed with flint brick facing; Wells Coates' flats at Palace Gate were faced with precast concrete slabs with a textured face; the Connell, Ward and Lucas

BELOW, L.-R.: KARDOMAH CAFE, PICCADILLY, MISHA BLACK. CRESTA SHOP, NEW BOND STREET, WELLS COATES. LONDON SHOE CO. SHOP, REGENT STREET, MALLET STEVENS. 1936.



ABOVE, L.-R. : "SHIPWRIGHTS," LEIGH-ON-SEA, WELLS COATES, 1936. COLLIERS WOOD METHODIST CHURCH, EDWARD D. MILLS, 1937. JOHN KEBLE CHURCH, MILL HILL, D. F. MARTIN SMITH, 1937.

house at Hampstead was finished with a special coloured rendering; Highpoint 2 was tiled externally and Chermayeff's house at Halland, Sussex, was constructed entirely of timber. All these buildings, now 12-13 years old, and suffering from lack of normal maintenance during the war years, have weathered very much better than the earlier 1930 buildings, greater care was taken in detailing giving less opportunity for failure in finishes or structure. In 1938 the M.A.R.S. Group held the first Exhibition of modern architecture in England, and at the Glasgow Exhibition. Thomas Tait showed for the first time in England what a contemporary Exhibition was like, the well designed temporary buildings were excellent. The brief respite from war fears ended in 1939, a year which saw the completion of Peter Jones, Sloane Square, by Slater, Moberley and Crabtree in association with Professor C. H. Reilly whose earlier work as head of the Liverpool School of Architecture had done much to help the rise of modern architecture. Many of the pioneer modern architects of this country were Professor Reilly's students at Liverpool. In 1939-40 most architects were busy clearing up the jobs in hand and wondering what would happen to them. Houses were still predominant: Newton Road, Paddington by Denys Lasdun (1939); a terrace of three houses, Hampstead, Erno Goldfinger (1939); Arkwright Road, Hampstead, Samuel and Harding (1939); Highgate Hill, Tayler and Green (1940); cottages, Stratford-on-Avon, F. W. B. and F. R. S. Yorke (1939). Other buildings completed before the war included Impington Village College (1940) Gropius and Fry; the St. Dunstan's Home, Brighton, Francis Lorne (1939); the H.M.V. Building, Oxford Street, Joseph Emberton (1939); Richmond School, Yorks, D. Clarke-Hall (1940).

1940-1944. The years of the second World War saw a temporary halt in the development of modern architecture throughout the world, with the exception of the U.S.A. where many of the continental architects who had originally settled in England had finally gone. Gropius, Breuer and Mendelssohn were joined by other Continental architects, including Aalto and Mies Van de Rohe. In spite of wartime controls, building licensing and restrictions, a certain amount of building work, primarily industrial, was carried out. The shortage of certain essential building materials, in particular steel and timber, led to the development of new structural techniques. Of particular importance was the development of shell membrane concrete construction used for many wartime buildings because of the economy in steel, e.g., factory canteen, Dagenham, Edward D. Mills (1945); the Prof. Holford group designed many excellent Hostels for wartime factory workers which were built for the Ministry of Supply, but generally the volume of contemporary architecture during the war years was very small.

1945-1950. With the end of the war the important priorities in building were housing, schools and factories. The group of

HOUSE AT HALLAND S. CHERMAYEFF, 1938.

FINSBURY HEALTH CENTRE, TECTON, 1938

PALACE COURT, WELLS COATES, 1938.

modern architects practising before the war were soon at work on a variety of buildings, and reference to architectural journals over the last five years will give an adequate picture of the development of modern architecture in that period. Modern schools are being designed for many Education Authorities, the pre-war *News Chronicle* Schools Competition won by Dennis Clarke-Hall had a considerable influence on present school design, in the same way as the influence of the Tecton 1935 C. and C.A. competition design can be seen not only in their own housing work, Spa Green, Finsbury (1949-50), but in the work even of the local authorities who design their own buildings. Modern architecture is represented on the Fine Arts Commission, the R.I.B.A. Council, the New Towns. The Festival of Britain South Bank scheme under the Director of Architecture, Hugh Casson, is being designed entirely by members of the modern movement.

On the surface it would appear that the battle for modern architecture has been won, that the first half of the 20th Century was the battle ground and that in the second half of the century modern architects will enjoy the victory won by the pioneers of the 1930's. This is only partly true, for although it is relatively easy to find at least one modern building in most districts of London, a much longer search is needed in most towns outside the Capital. In addition modern architecture still has its opponents, the standard of the design or the average Government building, Local Authority housing schemes, or Lessor scheme buildings, is still appallingly low and shows little signs of improvement over its counterpart of pre-war years. The second half of the 20th century has great possibilities, improved structural techniques such as shell concrete, prestressed concrete and high tensile steel, the examples of large scale contemporary buildings like the L.C.C. Royal Festival Hall by Robert Matthew, together with the experience of the past 20 years, should result in the development of English modern architecture in advance of any other country in the world.

PASSFIELDS FLATS, LEWISHAM, FRY, DREW & PARTNERS, 1950.
Drawing by Charles Ogden.

COMPETITION RESULTS

City Hall, Nairobi.

In the competition for the design of a City Hall for Nairobi, the Assessor, Professor L. W. Thornton White, has awarded the *First Premium* to Messrs. C. A. Levick, P. H. Connell and L. T. Croft, of Durban, South Africa. The *Second Premium* is awarded to A. Ball, of London; the *Third Premium* to Messrs. R. S. Cobb, H. D. Archer and H. Q. Scammell, of Nairobi.

Highly Commended: R. Dickinson, Khartoum, and S. Rowland Pierce, London. *Commended*: Eugene J. D'Anos, of Cape Town; F. Silvan, of Sydney, Australia; Messrs. H. Cullerne Pratt and Ronald P. Gray, of London, and J. O. P. O'Callaghan, also of London. There were 59 entries.

Addis Ababa

In the Architectural Competition for the design of an Imperial Palace at Addis Ababa, the *First Premium* has been awarded to Hugo Brunner and Hermann Kiess, of Stuttgart. The *Second Premium* is awarded to Henri Chomette, of Paris, and the *Third Premium* to Hubert Matuschek and Anton Ubl, of Gmunden, Austria. There were 102 entries.

COMPETITION OPEN

The County Borough of South Shields is promoting an Architectural Competition for the design of a Marine and Technical College, to be erected at South Shields. The Assessor is Mr. S. W. Milburn, M.B.E., F.R.I.B.A., and the premiums offered are £500; £250 and £100.

Designs are to be submitted by July 21, 1951. The last day for questions is March 21. Conditions of the competition (deposit 2 gns.) from Harold Ayrey Esq., Town Clerk, Town Hall, South Shields.

COMING EVENTS

Royal Society of Arts

- January 24, at 2.30 p.m. "Dry-rot and Timber." Speaker: W. P. K. Findlay.

Institution of Structural Engineers

- January 25, at 6.0 p.m. "Building on Fill with Special Reference to the Settlement of a Large Factory." Speaker: J. W. H. King.

Faculty of Surveyors of England, Faculty of Architects and Surveyors, Central London Branch

- January 26. Annual Dinner and Ball at the Savoy Hotel.

EXHIBITIONS

- An Arts Council Exhibition, Society of Mural Painters. Municipal School of Art, All Saints, Manchester, 15. January 15-27. Open 10 to 8 weekdays, 10 to 12 Saturdays.
- Mobiles and Stabiles by Alexander Calder, at the Lefevre Gallery, 30 Bruton Street, W.1. Open during January.

EVENTS AND COMMENTS

LA VIE COMMENCE DEMAIN

I WENT to see this film because le Corbusier appears in it, and I wanted to see how he managed as a film star. What I saw was a very brief interview with him on top and inside the Marseilles building, followed by a long speech "off" illustrated by pictures of slums and other architectural and social failings of our civilisation. There were no really good shots of the building and the speech was familiar.

The pattern of a great man speaking with illustrations from news and scientific films was repeated with a number of other well-known Frenchmen including André Gide, Jean Rostand the biologist, and Jean-Paul Sartre. The general theme, as far as I could disentangle it from the high-speed French, English sub-titles, hotch-potch of terror and horror pictures, and exciting music of Darius Milhaud, was that a young man going to Paris to see the sights is whisked there in a helicopter and shown life as it really is, and then in a series of interviews is shown what life could really be like if only the atom bomb did not overhang everything. I seemed to have heard that one before, too.

To bring their argument home the makers of the film found it necessary to delve into the visual records of atrocities, major operations—fortunately not in technicolour—artificial insemination, vivisection and other biological experiments to such an extent that I became confused as to which were supposed to be a good thing and which bad. However, there seemed to be no doubt that the young man in the film thought that the life of to-morrow was a jolly prospect as he sailed away from the terrace at Versailles in the helicopter with a nice plain girl whom he had only seen twice before, once in an existentialist night-club in Saint Germain Des Près and once reading archaeology in a female chummery. I, on the other hand, began for the first time to see possible advantages in the atom bomb.

The film is absolutely banned to all children under sixteen. I think that adults should be banned and children allowed to see it. They are far less sensitive to horrors than grown-ups, and with its atmosphere of all the Marches of Time past and to come, Wonder Books of This and That, Science Survey, and Professor Brainstorm, the film is only one step removed from many of the popular strip cartoons to be found in most daily papers.

L'ECOLE DE PARIS

SIR Alfred Munnings has already had his say about the new exhibition at the Royal Academy. He is reported to have advised a stiff drink before paying a visit. I found that the exhibition was as good as a stiff drink, although I admit to being baffled by some of the works. One of my favourites, Henri Rousseau's famous "Le lion ayant faim se jette sur l'antilope," is there, with its wonderful representation of a tropical forest, and Vuillard, Utrillo and Bonnard, Matisse, Dufy, Rouault, Léger and Braque are well represented. I thought that the usual crowd of private-viewers looked a trifle stunned in the more advanced galleries, but they were on the whole careful not to let the cat out of the bag. I did, however, hear one elderly gentleman, who may easily have been a Royal Academician, say that he thought that one of the larger paintings had been hung upside-down.

We should be very grateful to the President of the R.A., M. Georges Salles, the head of all the Museums of France, and to the numerous other experts who had a hand in bringing this exhibition to London and above all to the Royal Academy.

ROYAL GOLD MEDALLIST, 1951

Mr. E. Vincent Harris, O.B.E., R.A., F.R.I.B.A., who was elected at the R.I.B.A. Council Meeting on January 9, as a fit recipient of the Royal Gold Medal for Architecture for this year. H.M. the King has approved the award and the Medal will be presented to Mr. Vincent Harris, at the R.I.B.A., on Tuesday, April 3, 1951, at 6 p.m.

MARLOW BRIDGE

THE latest news about the beautiful suspension bridge over the Thames at Marlow is disquieting. Readers will remember that it was closed following a slight subsidence some months ago. The Highways Committee of the Bucks County Council has now issued a statement that the damage is more serious than was originally thought. It is hoped, however, that repairs will be completed by the end of this month. In view of the danger of further damage, the maximum permissible loads using it will be restricted to 2 tons. Even so, the Committee warns that further failures may occur in other parts of the bridge and that it is only a matter of time before the bridge will be closed again for repairs. The long term policy for the bridge is to be discussed with the Ministry of Transport. Since it was narrowly saved from demolition in 1937, the bridge may be said to be in considerable danger. Now is the time to launch a campaign for its preservation. Astragal proposes that it be declared an ancient monument, and I have pleasure in seconding.

ABNER

The long wing, block "D" has flats on the ground floor and maisonettes with corridor access above.

PASSFIELDS FLATS

for the Borough of Lewisham

architects: FRY, DREW & PARTNERS
assistant architect: J. B. SHAW
consulting engineers: OVE N. ARUP & PARTNERS

THE site for these flats is surrounded by semi-detached houses and formed an undeveloped portion of a housing estate when it was acquired by the Lewisham Borough Council for the erection of subsidised flats. Two houses were in fact built on the south-east corner of the site and a future road widening line in Bromley Road reduced further the space available for building.

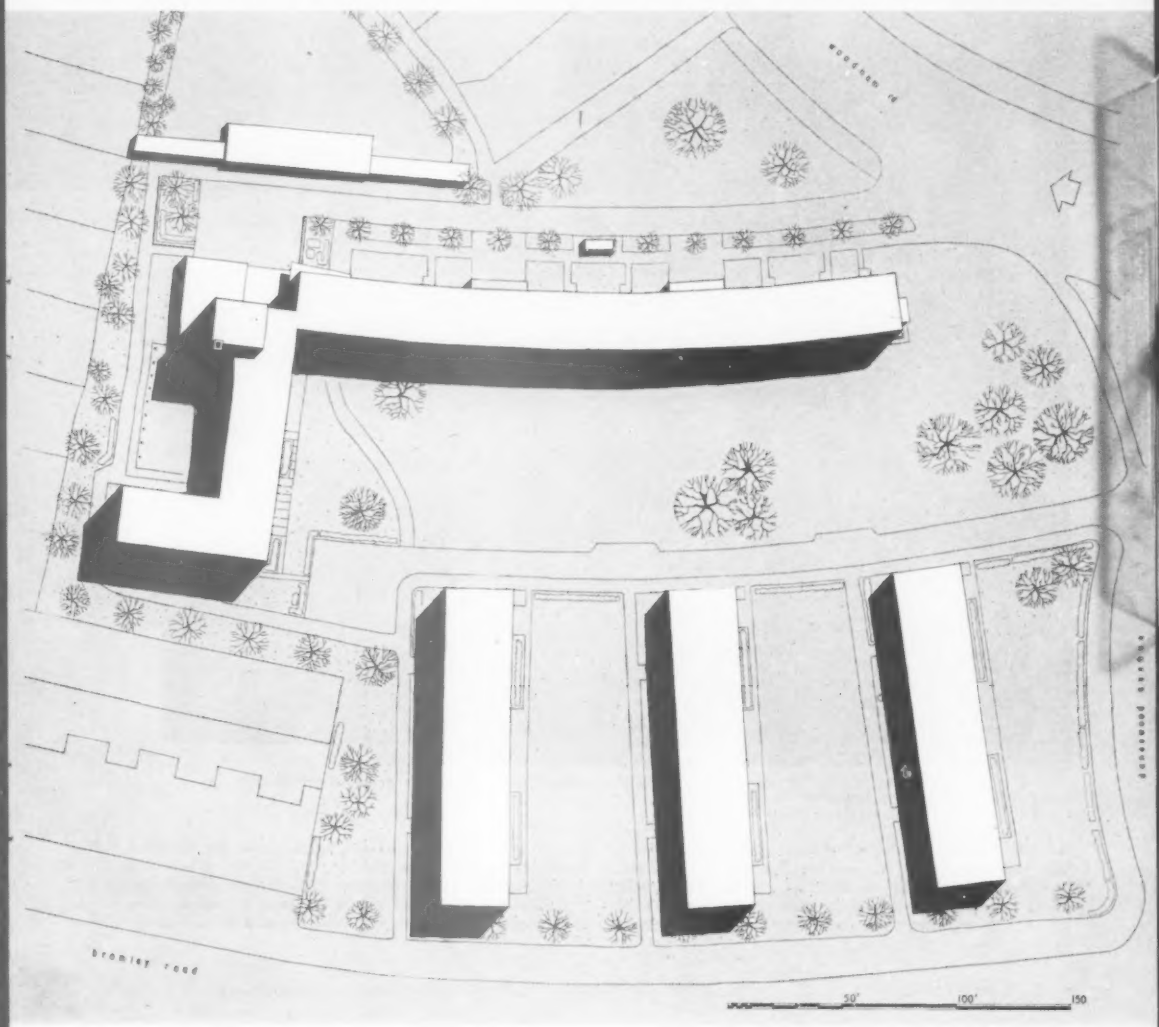
The site has no trees and is practically level. The gross area is four acres. The required density of dwellings was 25 to the acre and there was a statutory height limitation of 5 floors for the subsidised flats.

Bromley Road to the south-west carries very heavy traffic including trams. The road to the south-east is a small estate road and is used for access to the flats. The shape and aspect of the site and the need for avoiding rooms facing into Bromley Road suggested an aspect ranging from south-east to south-west. By building up in one large L-shaped block to the maximum permissible height on the north and east sides of the site, it has been possible to reduce the height of the remaining three blocks to 3 floors and to place them "end-on" to Bromley Road. This layout reduces the amount of shadow cast by the buildings and gives to all flats a sunny and pleasant outlook on to green spaces.

The L-shape of the five-storey block gives protection from the north and east to the central open space which will be planted with trees and shrubs.

The boiler room, laundry, tenants' stores and children's playground—all noisy places—are placed away from the living and sleeping rooms and the playground is screened from existing houses by thick plantations of willow.

Trees with light and open foliage will be planted along the Bromley Road frontage to screen and enclose the spaces between the blocks from the noise and traffic.



The curve of the high block protects the central open space from the North and East.

Trees are to be planted along Bromley Road to screen the open spaces between the blocks.

DETAILED PLANNING

The 3-storey blocks, A, B and C, along the Bromley Road frontage are identical and contain a total of 36 flats of two and three bedrooms and have staircase access. Private stores and a refuse room are provided at the bottom of each stair.

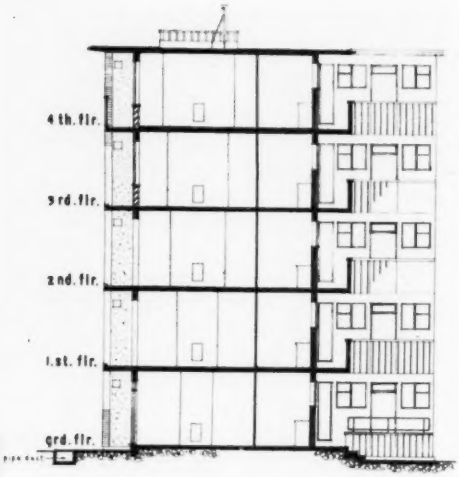
In the five-storey block the small wing facing south-east has access balconies on each floor. It contains five single room flats and twenty-five flats with one bedroom.

PASSFIELDS FLATS, LEWISHAM

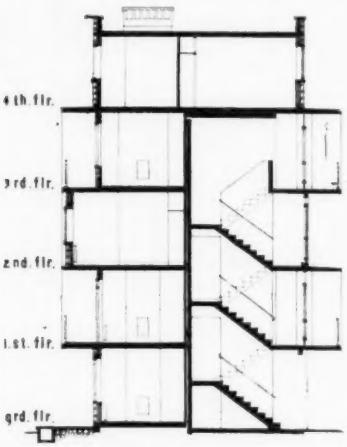
Balconies to maisonettes, South front, Block "D"

The larger wing faces south-west and contains 11 flats on the ground floor and 24 maisonettes with three and four bedrooms on the four upper floors. Here access balconies occur on the first and third floors only. All the access balconies in this block give direct access to one passenger lift and to three access stairs, two of which are contained within the main mass of the block, but are structurally independent in order to prevent staircase noises from entering flats. (See sections page 66).

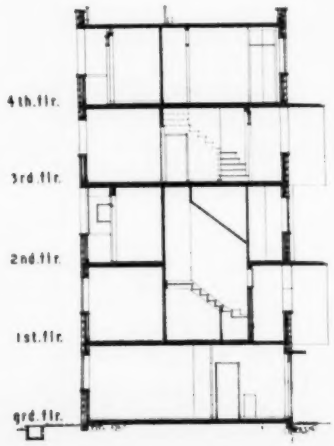
architects: FRY, DREW AND PARTNERS

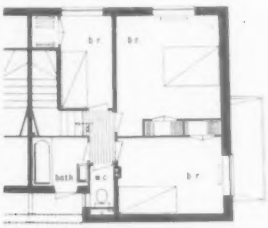


Section through short wing

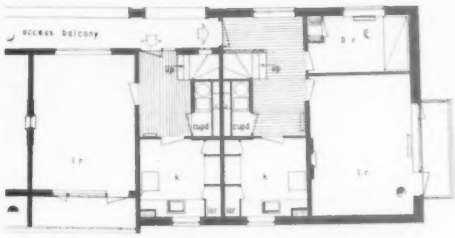


Sections





Upper floor of Maisonette

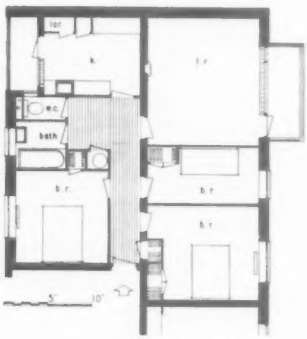


Maisonette types

single b.r. type "I"

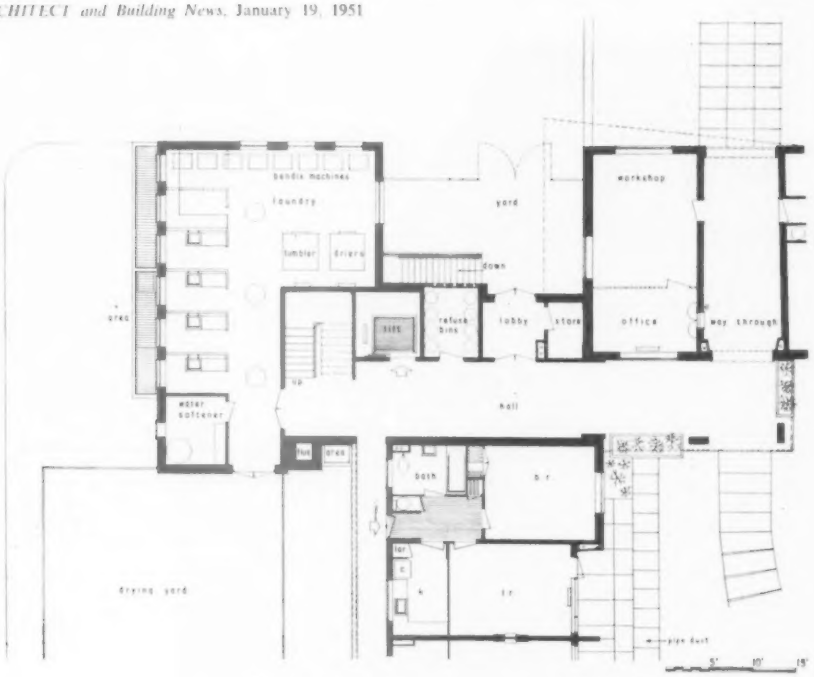
BLOCK "D"

Single Room Type.
BLOCK "D"

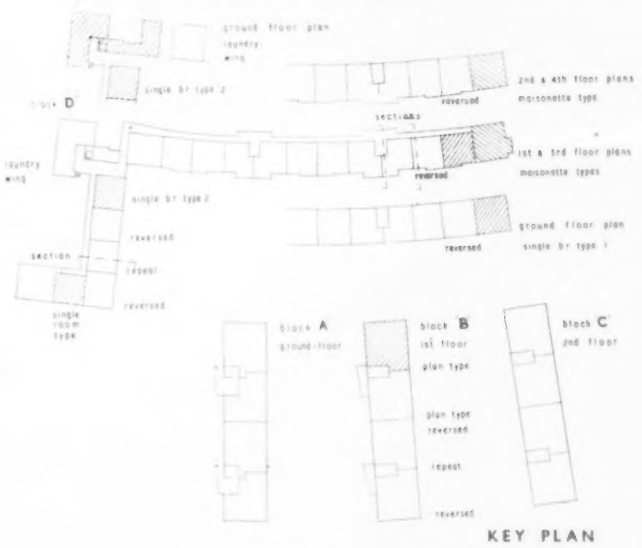


Typical flat
BLOCKS "A," "B" & "C"

PASSFIELDS FLATS, LEWISHAM



Ground floor laundry wing. BLOCK "D"



KEY PLAN

Refuse compartments are next to the lift and to the access stairs. Containers are removed by the caretaker's staff by means of a special wheel trolley and taken down to the boiler room yard in the passenger lift.

The laundry is placed at the junction of the two wings of the five-storey block. It is equipped with Bendix machines and two electrically operated drying machines. Four cubicles are provided, and each is fitted with a gas clothes boiler, a sink and wringer. Hot and cold water supplies are softened and an open air drying ground is accessible from the laundry.

architects: FRY, DREW AND PARTNERS

Balconies to flats, West front of the short wing. Block "D".

Typical South front, Blocks "A," "B" and "C."

CONSTRUCTION

The five-storey block is of "box frame" construction consisting of a series of cross walls and continuous floor and roof slabs—all designed as a self-supporting monolithic structure in reinforced concrete. Round the "box frame," external wall panels are built of 4½ in. brickwork, a cavity and 4 in. of clinker concrete blocks. These panels are supported on each floor slab by a continuous projection of the edge of the floor which is covered on the external face by a course of purpose made facing bricks 1 in. thick.

The cross walls of the "box frame" rest on strip foundations 4 ft. wide and at varying depths according to the complicated nature of the site formation which was found during excavation. The lower panels of the external walls are carried on concrete beams resting on the ends of the cross walls and below these beams there is free access for the various services to the interior of the block.

To provide insulation from noises transmitted into the structure and from excessive heat losses, a screed of light weight concrete 2 in. thick is laid over all floor slabs with additional insulation in the form of insulation boards to the floors of access balconies and the floors of rooms exposed to the open air. Pipes and conduits are accommodated in this screed which is then covered with a jointless composition floor finish. The living rooms have a floating floor of timber on battens.

In the construction of the 3-storey blocks, the outer walls are of solid brick with a 9 in. brick spine wall carrying the concrete floor slabs. The floors are insulated against sound transmission with screeds of light weight concrete 2 in. thick which also house the radiator pipes and electrical conduits.

The living rooms have floating floors of boarding on battens with glass quilt insulations. Central heating and hot water are supplied from one boiler room below the five-storey block.

FINISHES

Externally the main wall surfaces are buff coloured flint facing bricks with contrasting panel walls of render on blocks, the render is painted in contrasting colours. The exposed parts of the "box frame" which form the projecting sides of balconies have no applied finish beyond an application of white cement paint. The concrete walls of the access stairs and lift walls and other public spaces are painted with coloured cement paint.

COST

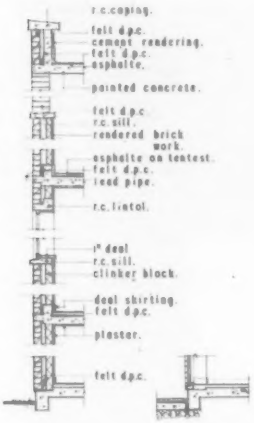
The contract price for 101 flats was £158,000 which includes for all garden work.

Top view shows the projection of the access corridor over the return wall of the workshop, Block "D." Below is a typical entrance to Blocks "A," "B and "C".

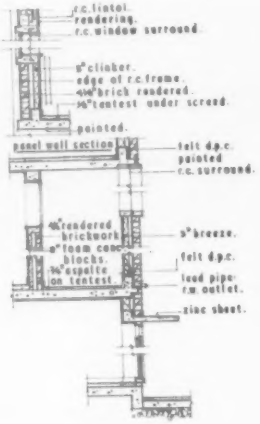
Projecting refuse compartments for maisonette dustbins are next to the lift and access stairs.

PASSFIELDS
FLATS
LEWISHAM.

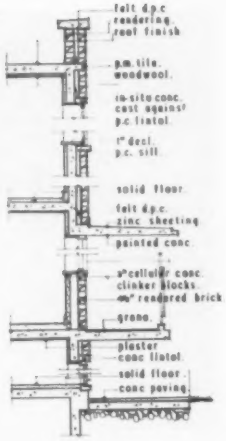
architects:
FRY, DREW
& PARTNERS



Typical front wall



Typical back wall

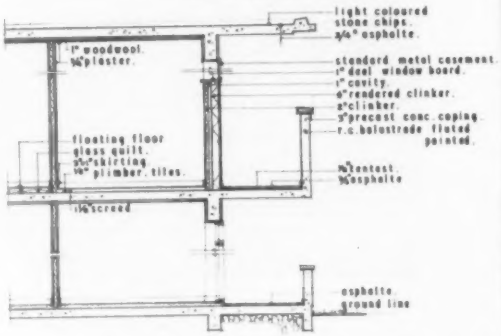


Typical end wall

GENERAL CONTRACTORS: WATES LIMITED.

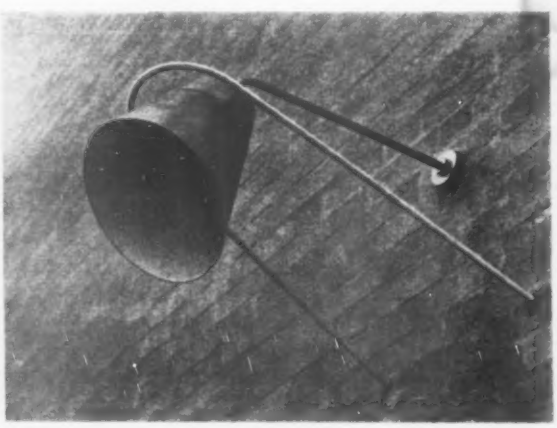
Asphalte Roofs and Floors: Kent Asphalte Co. *Bricks—Facing:* Uxbridge Flint Brick Co. Ltd. *Brickwork to 3-storey blocks:* G. & E. Hills. *Chain Link Fencing:* W. A. Skinner & Co. *Concrete—Precast:* Wates Ltd. *Doors and Joinery:* Ram & Austin Ltd. *Door Furniture:* Rennis Ltd. *Electrical Installation:* Brakefields Ltd. *Electrical Distribution:* London Electricity Board. *Electric Drying Tumblers in Laundry:* Isaac Braithwaite & Son, Engineers, Ltd. *Floor Finishes and Insulating Screeds:* S. Towers & Son Ltd. *Garden Work and Tree Planting:* J. Burley & Sons Ltd. *Gas Distribution and Installation:* South Eastern Gas Board. *Gas Fire Flues:* Nautilus Fire Co. Ltd. (in 3-storey block); True Flue Ltd. (in 5-storey block). *Glazing:* Wottons (Croydon) Ltd. *Heating, Hot Water and Plumbing:* G. N. Haden & Sons Ltd. *Kitchen Fittings:* Kandya Ltd. *Lift—Electric Passenger:* Hammond & Champness Ltd. *Light Fittings—Exterior:* Best & Lloyd Ltd.; Falk Stadelmann & Co. Ltd.; E. Smith (Horley) Ltd. *Louvre Air Ventilators:* Greenwood's & Airvac Ventilating Co. Ltd. *Metal Work (Tubular) to Balconies and Staircases and Steel Fixing:* E. Smith (Horley) Ltd. *Partition Blocks—Concrete:* Lokay Sales. *Paint:* R. Gay & Co. *Painting:* J. W. Thompson. *Plastering:* Southern Counties Plastering Contractors. *Refrigerators:* Electrolux Ltd. *Sanitary Equipment and Gas Fires:* J. S. & F. Folkard Ltd.; J. Young & Company. *Shuttering (Steel) to Floors:* Scaffolding (Gt. Britain) Ltd. *Tiling:* Allan & Cairns Ltd. *Washing Machines in Laundry:* Bendix Home Appliances Ltd. *Water Treatment Plant:* Candy Filter Co. Ltd. *Windows—Metal:* Crittall Manufacturing Co. Ltd.

Access balcony short wing



SECTIONS BLOCK "D" Scale : 6 ft. — 1 in.

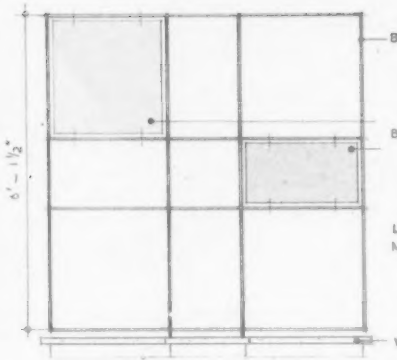
Below, Covered children's play space and bracket light, blocks A, B and C.



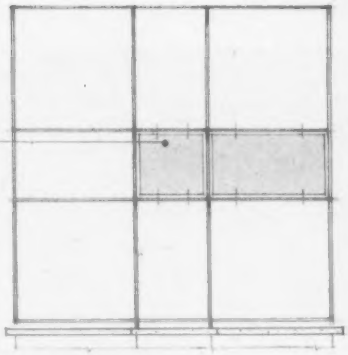
Main entrance from South, block "D"

PASSFIELDS
FLATS
LEWISHAM

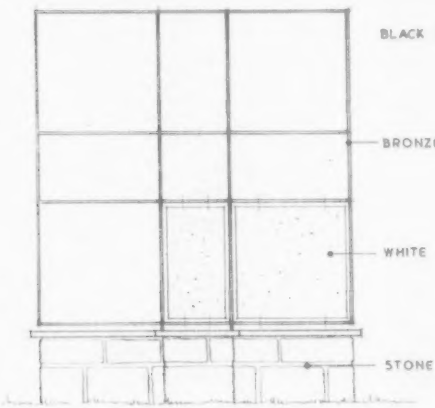
architects:
FRY, DREW
& PARTNERS



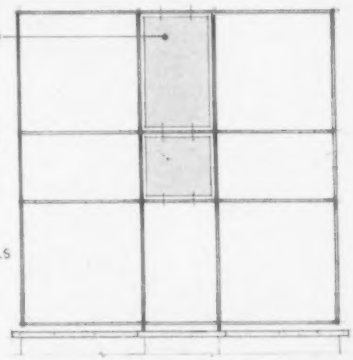
ELEVATION A



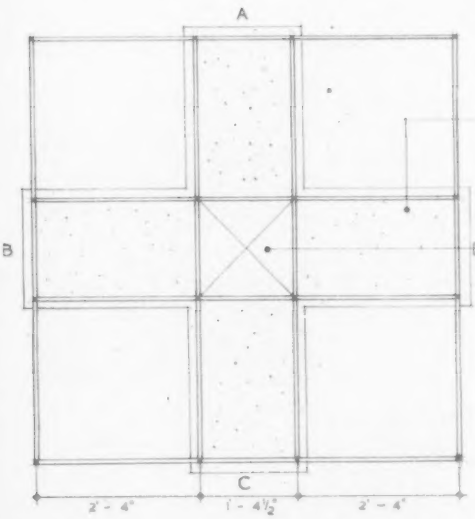
ELEVATION B



ELEVATION C

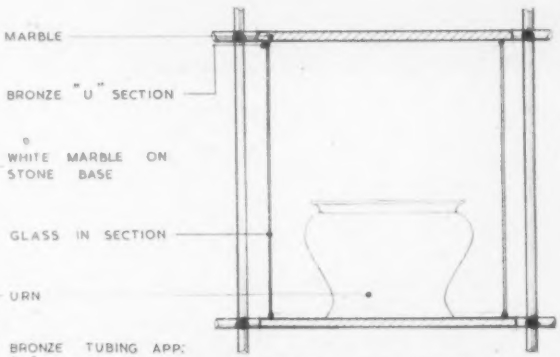


ELEVATION D SCALE ⅜" TO 1 FT.

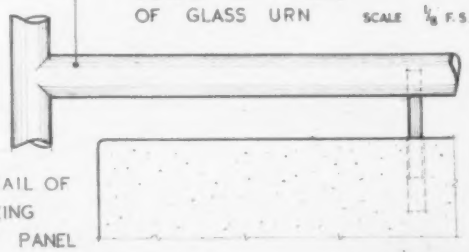


PLAN

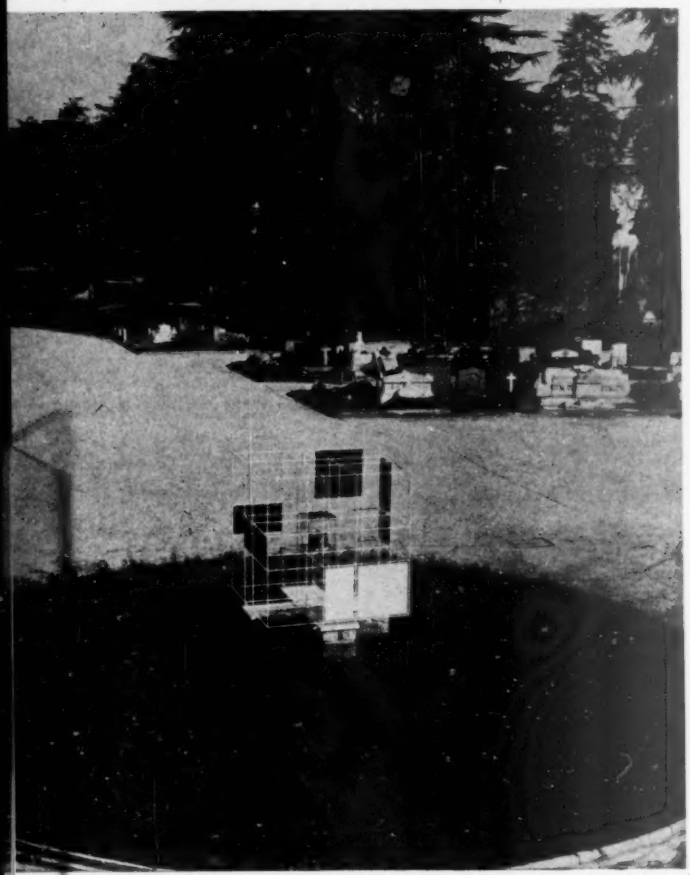
SCALE ½" TO 1 FT.

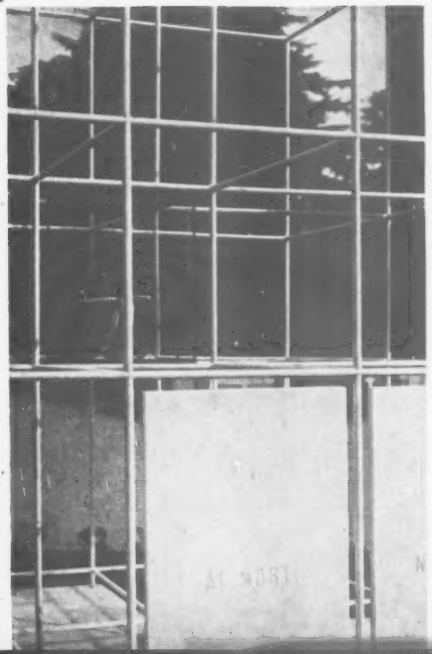


DETAIL OF FIXING OF GLASS URN SCALE ⅛ F.S.



½ F.S. DETAIL OF TYPICAL FIXING OF MARBLE PANEL





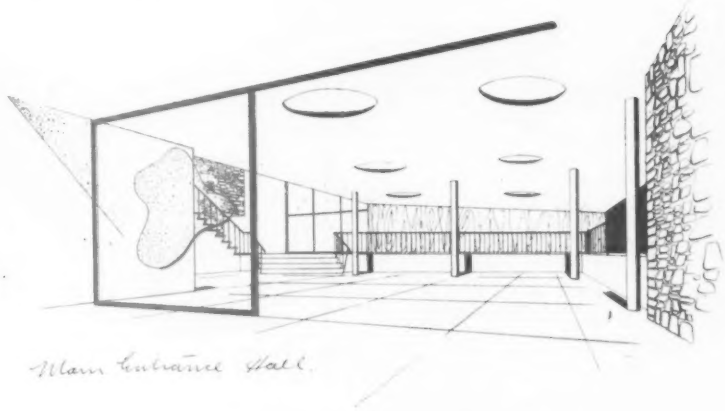
MONUMENT TO THE DEAD OF MAUTHAUSEN, MILAN

designed by

L. B. BELGIOIOSO
E. PERESSUTTI
E. N. ROGERS

COLLEGES OF FURTHER EDUCATION

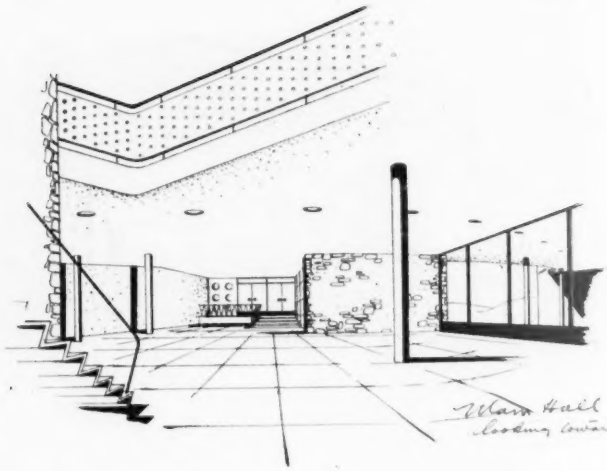
for the Glamorgan County Council

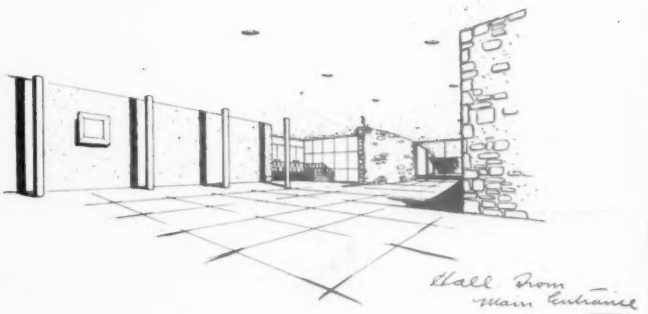


Gorseinon College

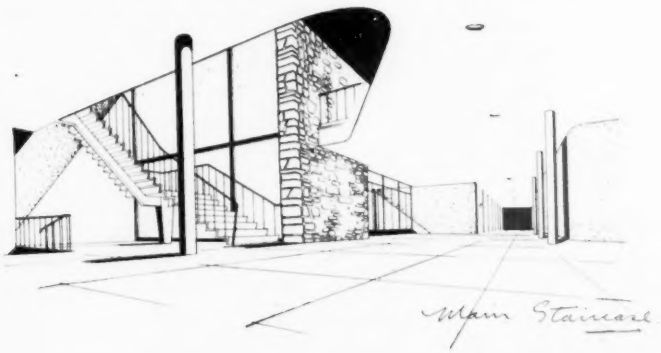
Architects:
GOLLINS
MELVIN
& WARD
in collaboration with
L. R. GOWER, F.R.I.B.A.,
County Architect.

In 1949 the Glamorgan Education Committee received approval from the Ministry of Education to proceed with the development of plans for the proposed Colleges of Further Education at Aberdare and Gorseinon. Both Colleges were to be built on the outskirts



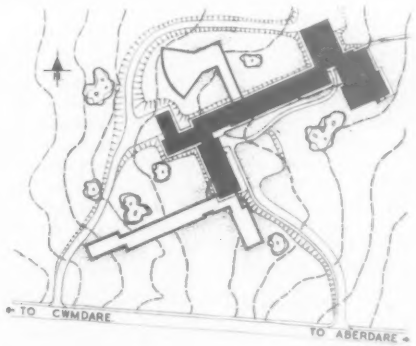


Aberdare College of Further Education



of existing industrial towns where an intensive drive to start new industries was planned and were, at the same time, to act as centres for further education and social activities for a considerable distance around. The Colleges when completed would each have full time

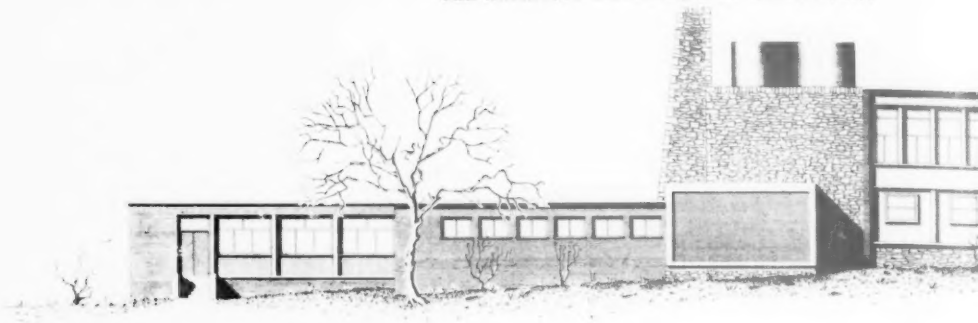
Education Committee's original intention was that the assembly halls should be of an orthodox rectangular shape, with a flat floor suitable for multi-purpose use. After further consideration of the problem, however, it was decided to plan an assembly hall that would be ideal for lectures, concerts and dramatics, and to place the common rooms side by side so as they could be thrown into one for dances. These have been planned in each case on the first floor to ensure adequate cross lighting and outlook, without interfering with the main circulation of the Colleges.

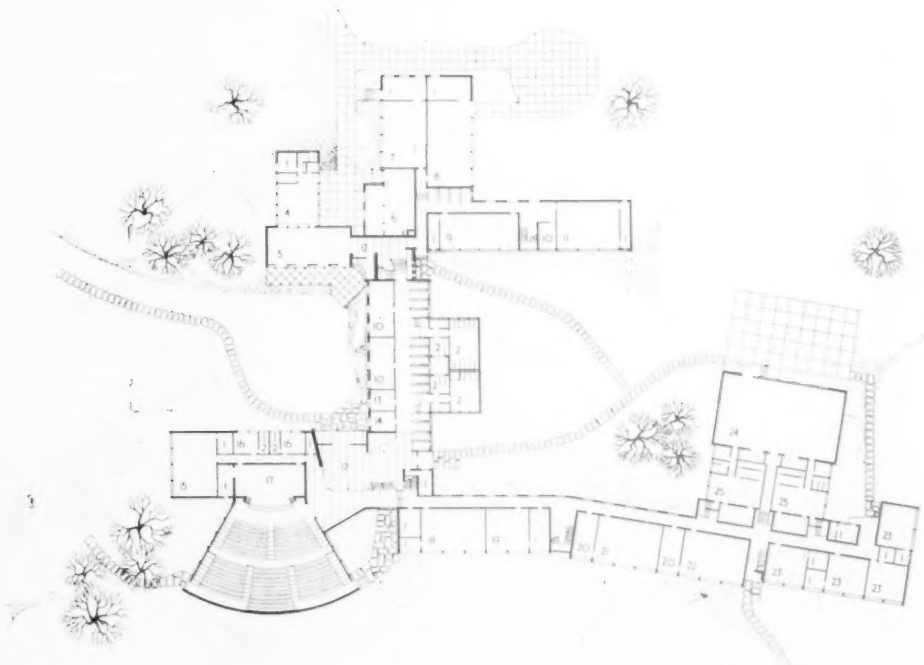


Both the sites are steeply contoured and are immediately over old mine workings, which owing to the dangers of subsidence required that the buildings should not be over two storeys high, built of reinforced monolithic concrete construction, in units not exceeding 90 feet in length to obviate the risk of cracking and settlement.

At Aberdare the plan shape was dictated by the necessity of keeping the building as closely as possible to the contours, as far away from the noisy main Aberdare-Hirwaun Road and ensuring that all teaching spaces received a sunny aspect. Access is from the Aberdare-Cwmdare secondary road.

Both Colleges will be built in two stages, the extent of the first stage is indicated in solid black on the site plans.





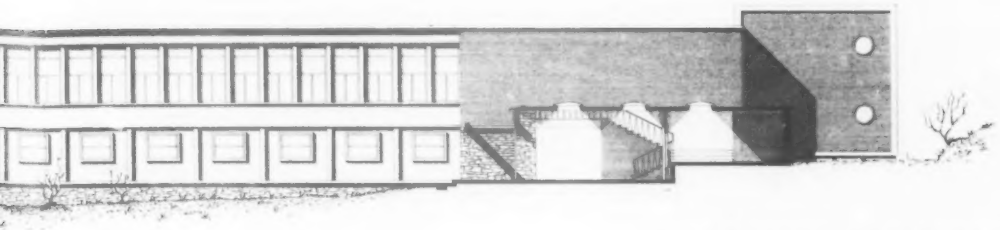
COLLEGES OF FURTHER EDUCATION

for the Glamorgan County Council

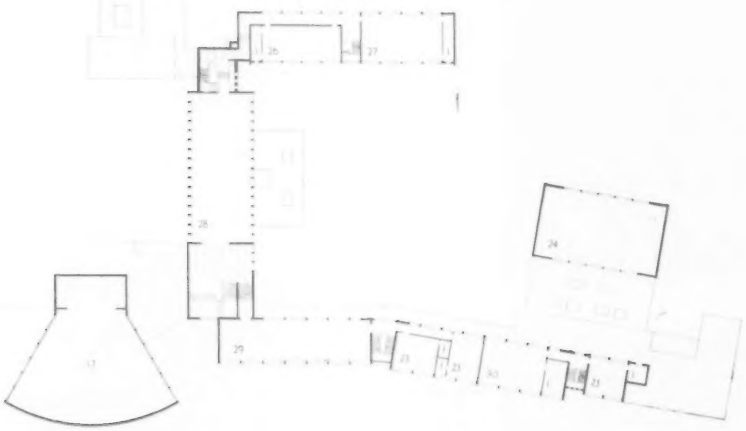
Architects: GOLLINS, MELVIN AND WARD
in collaboration with L. R. GOWER, F.R.I.B.A., County Architect

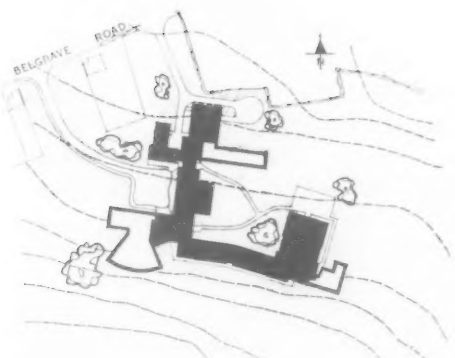
courses, for 300 pupils and would also run part time evening classes, as well as providing facilities for concerts, dramatics and social gatherings.

The Schedule of accommodation for each College is generally alike. Teaching space is nearly equally divided between classrooms and practical rooms and there is also a gymnasium, two large common rooms which can be made into one very large room for dances, and a stepped fan-shaped assembly hall, for which advantage of the sloping sites has been taken. The



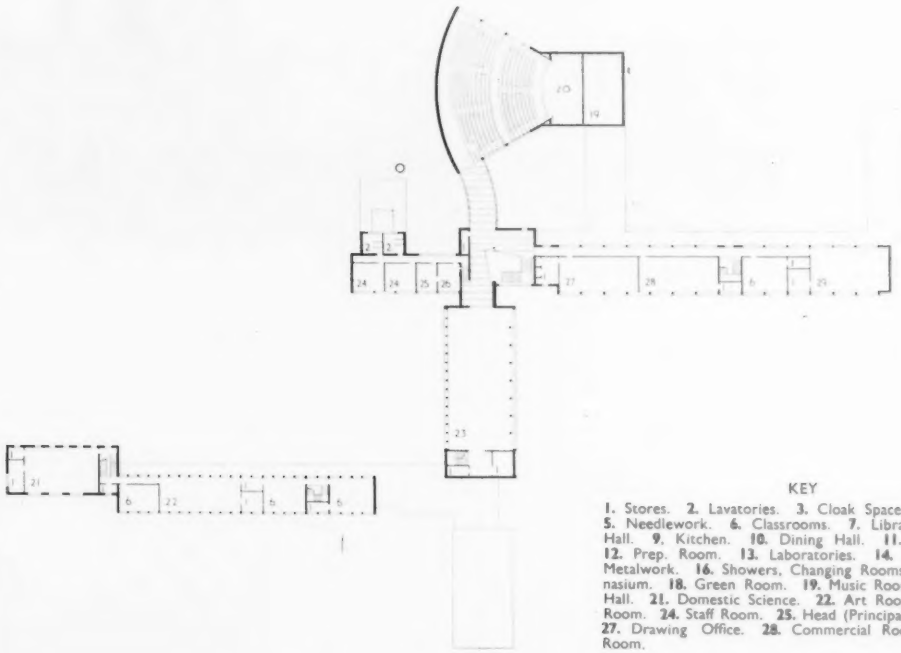
GORSEINON COLLEGE





KEY

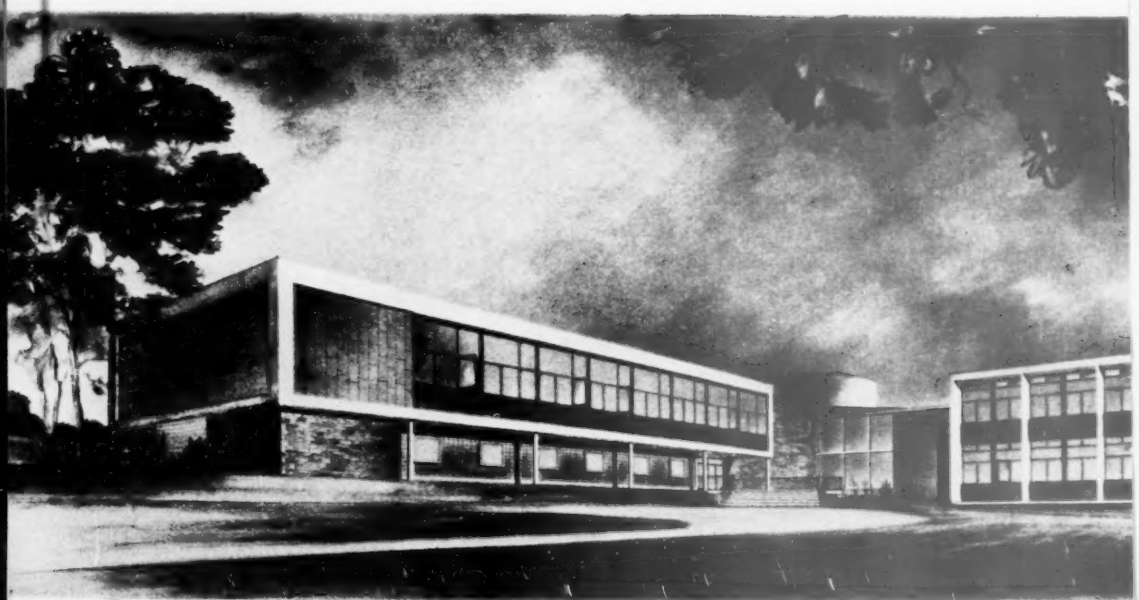
1. Stores. **2.** Lavatories. **3.** Cloak Spaces. **4.** Kitchen. **5.** Dining Hall. **6.** Boiler House and Fuel Store. **7.** Woodwork. **8.** Metalwork. **9.** Craftroom. **10.** Staff Rooms. **11.** Art Room. **12.** Entrance Hall. **13.** Head. **14.** Secretary. **15.** Music Room. **16.** Green Room. **17.** Assembly Hall. **18.** Commercial Room. **19.** Lecture Room. **20.** Prep. Room. **21.** Laboratories. **22.** Mining Science. **23.** Classrooms. **24.** Gymnasium. **25.** Changing Room, Showers, etc. **26.** Needlework. **27.** Domestic Science. **28.** Common Room. **29.** Library. **30.** Drawing Office.



KEY

1. Stores. **2.** Lavatories. **3.** Cloak Spaces. **4.** Craftroom. **5.** Needlework. **6.** Classrooms. **7.** Library. **8.** Entrance Hall. **9.** Kitchen. **10.** Dining Hall. **11.** Mining Science. **12.** Prep. Room. **13.** Laboratories. **14.** Woodwork. **15.** Metalwork. **16.** Showers, Changing Rooms, etc. **17.** Gymnasium. **18.** Green Room. **19.** Music Room. **20.** Assembly Hall. **21.** Domestic Science. **22.** Art Room. **23.** Common Room. **24.** Staff Room. **25.** Head (Principal). **26.** Secretary. **27.** Drawing Office. **28.** Commercial Room. **29.** Lecture Room.

ABERDARE COLLEGE



NEWS of the BUILDING INDUSTRY

The usual features of News of the Building Industry including Interest, Mosaics, and Good, Bad or Indifferent are excluded from this special number, but will appear again in the next and succeeding issues.—Ed.

Presidential Personalities of 1951

THE NEW PRESIDENT OF THE L.M.B.A.

The significance of chains of office—those imposing and sometimes decorative emblems worn by important people on important occasions—is perhaps not always fully appreciated. The very word chain has associations synonymous with lack of freedom. "Fetters, confinement, restraining force" says the Concise Oxford Dictionary. "The old ball and chain," says the cockney. The restrictive effect of the chain, be it official ribbon or domestic apron string, in fact, is something which cannot be overlooked. It needs a strong man to submit to the restraints of chaining without loss of personal strength.

Today, chains of one sort or another are the lot of most members of the Building Industry. The Presidents of official bodies representing that industry carry a greater responsibility and weight than ever before when they don their chains of office.

Personal views, however logical, do not always represent official policy, and today it is generally only through official channels that individual progress can be made. But it is as well to remember that underneath the official exterior of a President, there is always a human being whose personality, added to his official standing, will be the measure of his success.

1951 is likely to bring more rather than fewer problems for solution by the Building Industry. The National Federation of Building Trade Employers and the London Master Builders' Association carry a tremendous weight of responsibility, not only to members of the industry, but to the layman. In the coming twelve months much of the responsibility for the successful negotiation of problems will fall on the shoulders of two men, Councillor Stephen Hudson, the incoming President of the N.F.B.T.E., and Mr. D. F. Cox, President of the L.M.B.A. We take this opportunity of wishing them every success in their official capacities.

Above: Councillor Hudson.
Below: Mr. Dudley F. Cox.

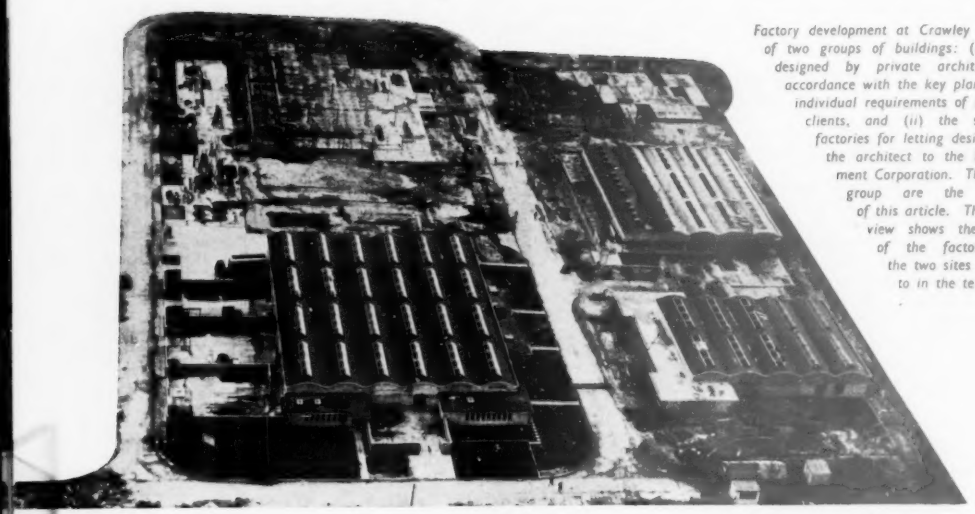
In Mr. Dudley F. Cox, the L.M.B.A. have a true Londoner as their new President. Born in the heart of London in 1898, he was educated at Merchant Taylors' School while it was still in Charterhouse Square.

Shortly after leaving school, he enlisted in the Inns of Court O.T.C., and was commissioned into the Royal Flying Corps in 1916, serving in France as a pilot with No. 66 Squadron in the following year. Subsequently, he held staff appointments at the Air Ministry and Middle East Headquarters. In 1919, he returned to England, and on being awarded a permanent commission was further employed on staff duties at the Air Ministry until 1923.

In that year he resigned his commission in order to join his father-in-law's firm, Haymills Limited, of which he is now chairman and managing director.

Mr. Cox has been closely associated with the L.M.B.A. for the past dozen years. He was Chairman of the North Western Area, in which his firm has its headquarters, in 1942, the year in which the L.M.B.A. Areas were established, and it was largely due to his energy and enthusiasm that they were able, so quickly and effectively, to take their part in the L.M.B.A. machine. Mr. Cox was a member of the Council of the National Federation in 1941 and 1942 and since 1948 he has again represented the L.M.B.A. at New Cavendish Street.

Mr. Cox brings to his task as President substantial experience of the ways of Government Departments. In January, 1943, he was invited by the Ministry of Works to take charge of the scheme then being developed for the repair of lightly bomb-damaged houses. Within two months of his arrival, the scope of his duties widened, and he was appointed Deputy Director of Emergency Works and Chairman of the Works and Buildings Emergency Organization, with which his predecessor as President, Mr. R. R. Costain, had been closely associated. The W. & B.E.O. was concerned with the voluntary organization of building firms all over the country to deal with emergencies. The experience should stand him and the L.M.B.A. in good stead in a year which promises more emergencies. A keen business man, and a believer in free enterprise with a capital E, Mr. Cox may find the chains of office restraining. But that he has the physique and personality to carry them, there is no doubt.



Photoflight

Factory development at Crawley consists of two groups of buildings: (i) those designed by private architects in accordance with the key plan but to individual requirements of separate clients, and (ii) the standard factories for letting designed by the architect to the Development Corporation. The latter group are the subject of this article. The aerial view shows the layout of the factories on the two sites referred to in the text.

FACTORIES at CRAWLEY NEW TOWN

A development in concrete barrel roof construction

*

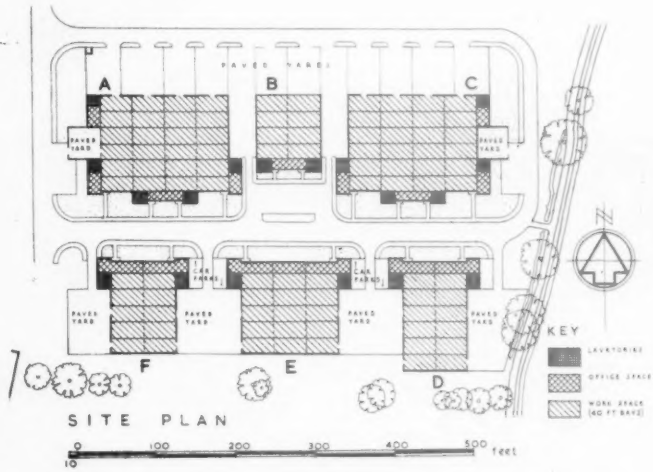
A. G. Sheppard Fidler, M.A., B.Arch., F.R.I.B.A. A.M.T.P.I.
Chief Architect to
Crawley Development Corporation

*

G. W. Jepson, Dip. Arch., A.R.I.B.A.
Architect in charge

*

Messrs. Gardiner & Theobald
Quantity Surveyors



DEVELOPMENT work at the New Town of Crawley has progressed rapidly in recent months, despite a summer which has been hostile to building work in more ways than one.

Interest now centres on the work which has been carried out and is still in progress on the new standard factories. Much of this work is of a practical experimental nature. That is to say, each group of buildings as it is erected produces fresh data which is analysed and checked for incorporation in the next group.

Development of this factory section has not been without difficulties. First and foremost has been the problem of obtaining licences for the separate tenancies. Each tenant has been obliged to obtain an individual licence, despite the fact that there may be 2, 3 or even 4 tenants in one building. The restrictive effect of this policy, not only on estimating the cost of work, but on building operations themselves is obvious.

A primary requirement for the successful building of the New Town is that the development shall be balanced. The various types of building—houses, factories, shops and complementary buildings—must therefore be built in conformity with a strict time schedule. Many factors outside the architect's control contribute to delay and if the architect or contractor fails to organize the job—off and on the site—such failure may well disrupt the whole programme.

So far balance and progress have been maintained at Crawley, thanks partly to the co-operation shown by incoming tenants both of factories and houses.

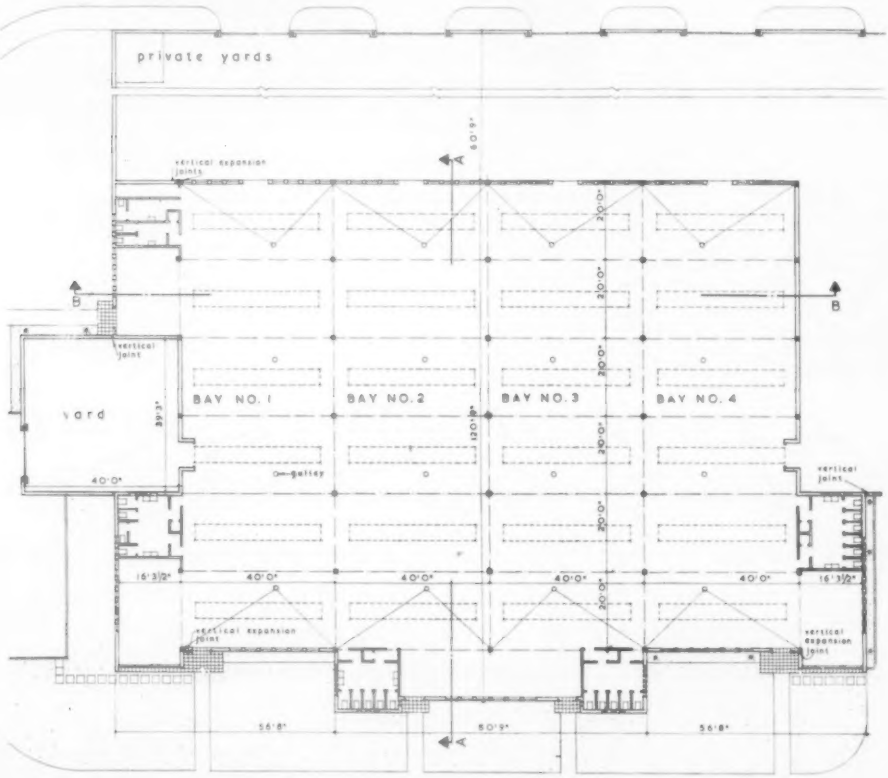
It was decided, when laying down the original factory plans, to adopt a small planning unit so that individual factory tenants could take as little as 2,500 square feet. But it has since been shown that the majority of tenants take more than the minimum. The modular measurements decided on are, however, proving satisfactory.

There are two factory areas—Site 1, 90,000 square feet and Site 2, 99,000 square feet. Buildings on site 1 have afforded the opportunity for experiment and adjustment, the results of which are being incorporated as standard practice on Site 2.

CONSTRUCTION

The type of light industry which is catered

Above—a typical exterior. From the window heads upwards the walling is of concrete, below it is of light coloured brick. Note the absence of down pipes from the main roof.
Below—the plan shows a typical layout. The direction of the vaulting would allow for extension but extension is not envisaged as it is more expedient to move expanding tenancies to a larger factory or to take over from a neighbour and pay compensation. The vaulting only covers the actual factory space and is based on a 40 ft. by 20 ft. module.



GROUND FLOOR PLAN

for on the Industrial site at Crawley New Town is varied. Most of the factories are to be occupied by "end" industries. The standard factories illustrated here have been designed for letting. Initial cost of the buildings was therefore a vital factor if the factories were to be let at attractive rents.

Other factors which influenced the choice of the structural system were (i) the need for clear floor space; (ii) good even lighting; (iii) heating, adjustable by individual tenants to suit their own requirements.

In the light of these requirements several different methods of construction were carefully considered and it was found that shell roof construction supported on concrete columns with brick infilling was not only the most economical system in cost, but satisfied most of the other requirements. Moreover, it has been shown in practice that some of the results are better than was expected. For instance, by accurate designing of the reinforcement, the thickness of the roof has been reduced to a minimum; by slightly increasing the width of the roof openings, a natural daylight factor of 20% has been achieved compared with the 15% aimed at.

COLUMN SPACING, HEADROOM, ETC.

At the sketch design stage it became apparent that the 40ft. by 20ft. spacing of columns could not be departed from without throwing other design factors out.

The provision of services in easily fixed uninterrupted runs, which would at the same time provide quick access, was desirable. By bringing each barrel to a flat soffit, at its junction with the adjoining barrel, enough space was left on the sides of the transverse beams to run cable trunks, gas services and water pipes in unbroken runs (see illustrations on page 84).

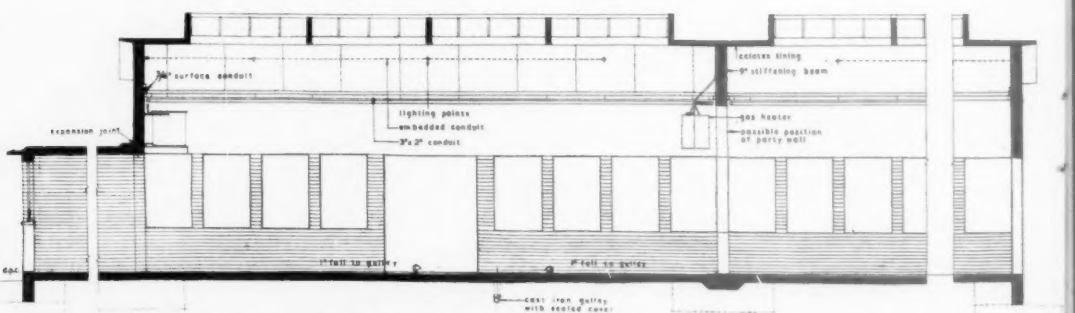
Suspension of additional factory services and other plant from the roofs has been allowed for by the incorporation of built in sockets in the underside of the barrels. Special clips were designed to take fixing plugs for this purpose and these also serve as additional fixing for the roof lining.

FINISHES

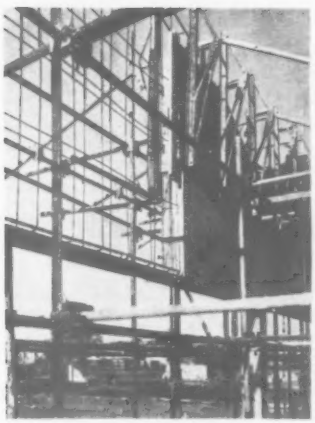
With a roof of this thickness (approximately 3in. at the apex) the problem of thermal insulation against heat penetration in summer and heat loss in winter, needed careful consideration. At the same time, expensive systems of insulation were ruled out. The method adopted has given good results with reasonable internal finish. Internal roof linings are of asbestos sheeting, laid on the steel formwork for the roofing. The concrete is placed on the sheeting and covered externally with patent

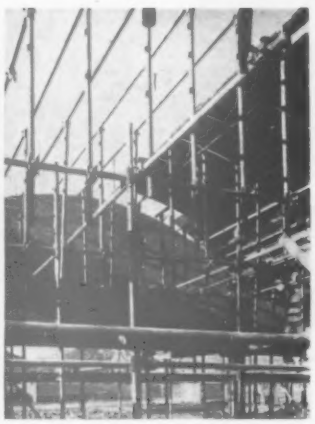
DETAILS OF ROOF CONSTRUCTION

Above—the upper view shows the bituminous felt roof covering and the natural gutters formed by the roof shape. Rainwater falls to gulleys connected to downpipes encased in the columns. The lower picture shows the large obstruction free floor areas provided by the use of this system. The building of internal walls etc., can all be done under cover.



LONG SECTION B-B





Above—Three stages in the construction of the roof. Top, the reinforcement for the ends of the barrels is placed in position on the column supports. Below, left, the concrete is poured. Below, right, the shuttering is struck and the steel formwork for the concrete barrel is laid on temporary steel scaffolding.

bituminous roofing in three layers. When the formwork is struck, the under surface of the ceiling is sufficiently good to take direct decoration. (See illustration page 84)

The concrete of the columns and in the transverse beams, which form the ends to each barrel, has been left direct from the shuttering.

Beneath the soffits of these beams all internal and external walls and partitions are built of flint bricks, which are accepted by the Factory Authorities as providing an adequate internal finish without decoration.

Floors throughout the factories are granolithic all laid to slight falls to gulleys. Special arrangements for treatment of acid effluents have to be made by individual tenants.

LIGHTING

Dome type natural lighting was considered, but was not found to give such even results as the trough system finally adopted.

Windows are provided in certain external walls, but these are more to provide outlook and to relieve the dead effect of blank walls than for lighting.

ARTIFICIAL LIGHTING

Steel conduits for electric wiring are embedded in the concrete of the barrel roofs, with junctions at fixed intervals, from which pendants can be hung.

HEATING

Thermostatically controlled gas heaters, mounted on swivel brackets, are fitted in each bay. Tenants can adjust the heat to their own requirements.

OFFICE ACCOMMODATION

The office accommodation is planned clear of the factory floor space as a separate plan unit. Offices are 8ft to 9ft. in height and are flat roofed. In the first blocks to be erected these flats were independent of the main structure, being butt jointed with an expansion joint.

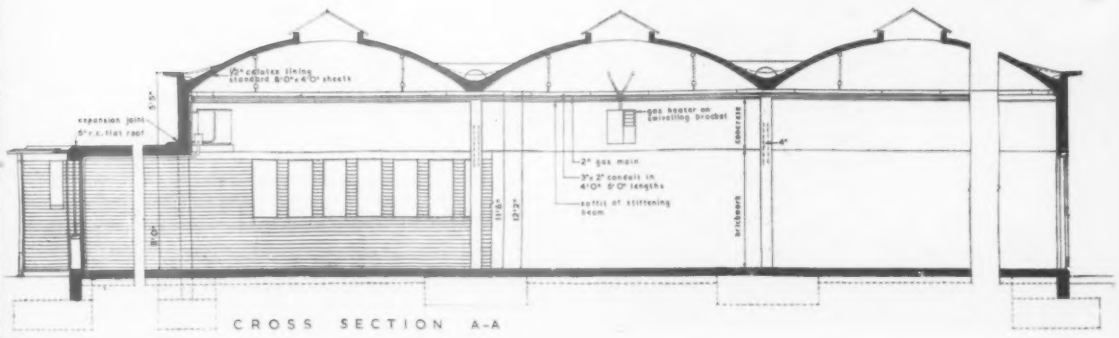
In later blocks the steel reinforcement of the lateral beams of the factory space is bent horizontally to reinforce the flat roofs of offices and lavatories.

LAVATORY ACCOMMODATION

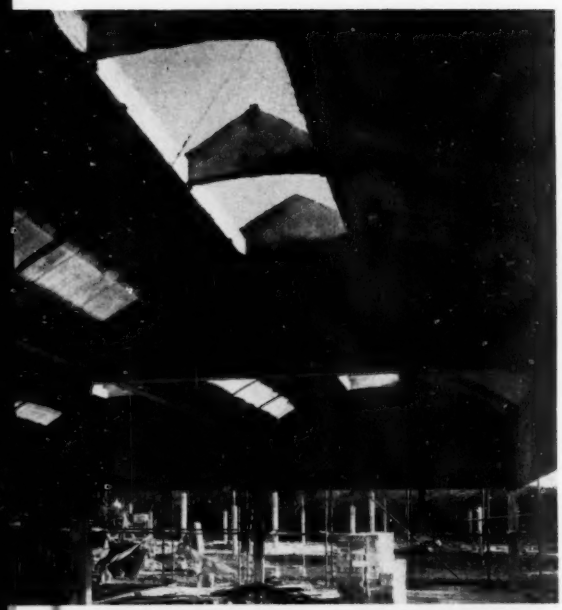
Alternative provision is made in every block for connection of urinal or W.C. fittings. The lavatory accommodation can therefore be adjusted as necessary to suit male or female demand.

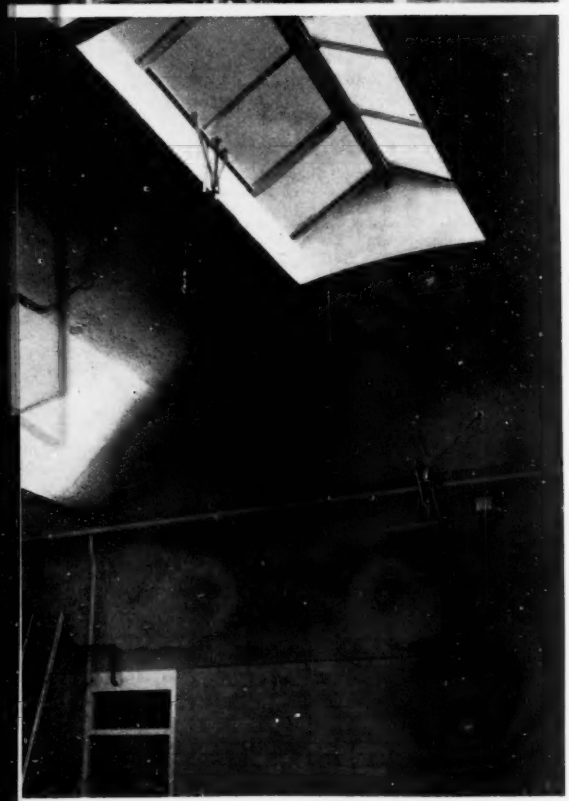
VENTILATION

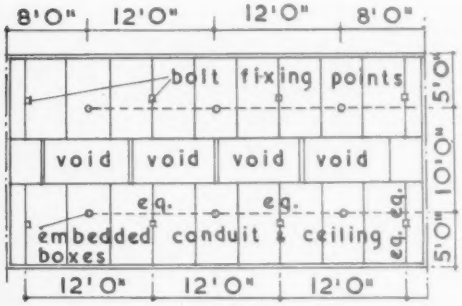
Ventilation is by normal opening casements in offices and lavatories and by opening roof lights in the factory space.



CROSS SECTION A-A







PLAN OF TYPICAL BARREL SOFFIT

CONTRACTORS AND SUB-CONTRACTORS

GENERAL CONTRACTOR
Holloway Bros. (London), Ltd.

REINFORCED CONCRETE CONSULTANTS
Barrel Vault Roofs (Designs), Ltd.

BRICKS
Uxbridge Flint Brick Co.

CABLE TRUNKING
Davis Sheet Metal Co., Ltd.

ELECTRICAL WORK
J. H. Plant, Ltd.

INSULATION
Celotex, Ltd.

INTERNAL TREATMENT OF BARRELS
Permacem, Ltd.

IRONMONGERY
Lockerbie & Wilkinson, Ltd.

PAINTING
Indestructible Paint Co., Ltd.

PATENT GLAZING
Williams & Williams, Ltd.

REINFORCEMENT
Twisteel Reinforcement, Ltd.

RAINWATER GOODS
Vitreflex, Ltd.

ROOF COVERING
Rock Asphalte Co., Ltd.

ROOF LIGHTS
Williams & Williass, Ltd.

ROOF LIGHTS FOR LAVATORIES
Lenscrete, Ltd.

SANITARY FITTINGS
John Knowles & Co., Ltd.

SINKS AND LAVATORY BASINS
Easiclene, Ltd.

The top picture shows the roof lining before decoration. Note that the soffit at the junction of the barrels has been flattened to allow a through run for the electric wiring trunks, one of which can be seen on the transverse beam. A typical vault plan is shown at top right. Left is a detail of a factory which is in operation. The picture shows (i) the method of opening the aluminium roof lights, (ii) the finished decorated surface of the roof lining, (iii) the grouping of service runs, (iv) a typical gas heater, (v) a connection to one of the electric points with a lead running to a fluorescent fitting. Below and to the left of this connection can be seen one of the patented clip sockets into which plugs for carrying suspended gear can be fitted.

HALF A CENTURY OF CONCRETE DEVELOPMENT

By Rolt Hammond, A.C.G.I., A.M.I.C.E.

IN November, 1949, the centenary of the introduction of reinforced concrete was celebrated in Paris by the Chambre Sindicale des Constructeurs en Ciment Armé de France. It was fitting that this should have taken place in France, because no other country can lay claim to such outstanding figures as Considère, Hennebique, Caquot and Freyssinet.

Monier, a French gardener, was responsible for developing reinforced concrete in building work, and in 1893 Hennebique built an arch of 50 metres span in concrete. In Great Britain one of the pioneer structures in mass concrete is the Glenfinnan Viaduct on the West Highland Railway, consisting of 21 arches, each 50 feet span, and with a maximum height of 100 feet. This was built in 1896.

Advances in constructional techniques often come about gradually and in a seemingly haphazard manner, frequently stimulated by such external influences as war demands or the urgency of large reconstruction schemes. As long ago as 1886 Doehring, a German engineer, took out a patent for the manufacture of mortar slabs for protecting timber floors against the effects of fire; he applied tension to the steel wire reinforcement before casting the mortar, releasing this tension after the mortar had hardened. Thus was born the conception of prestressed concrete as we know it today, and this gave rise to a vast number of subsequent patents including that of P. H. Jackson of San Francisco, for "Construction of artificial stone and concrete pavements" taken out in 1888. In his system, Jackson imparted preliminary compressive stresses in concrete arches and floors by tightening the tie-rods with the aid of turnbuckles or by other means.

By 1910 modern prestressed concrete technique had gained enormously from the work of many pioneers, and in 1928 a considerable step forward was made by R. H. Dill, who produced prestressed concrete fence posts and channel slabs by a process of post-tensioning the reinforcement, employing steel with high elastic limit and high ultimate tensile strength, coating it with a lubricant to prevent it bonding with the concrete, and applying the tensile load after the concrete had hardened. One end of the reinforcing bar was bent to the shape of a hook and bonded in the concrete, while the other was threaded and protruded from the concrete, tension being applied by tightening a nut over a cast-iron washer.

Dischinger was the first to apply the post-tensioning idea to the construction of prestressed concrete arch and girder bridges, the first structure of this type having been built at Saale, Germany, in 1928; here the steel reinforcement was strained by means of hydraulic jacks, the steel having an ultimate tensile strength of from 34 to 39 tons per sq. in. In Freyssinet's early work, he used alloy steels for reinforcement with an ultimate tensile strength of 60 tons per sq. in., subjecting the concrete to vibration, heat and pressure, thereby obtaining a material with a cube compressive strength of up to 13,000 lbs. per sq. in. and even higher, accompanied by slight shrinkage. Hoyer later employed very thin drawn steel wire as reinforcement, producing prestressed concrete railway sleepers and floor beams.

Many other developments in concrete have also taken place during the last half century, one of the most important discoveries having been that of Abrams, whose researches in the United States during World War I revealed that the water/cement ratio in concrete alone determined its strength, but only so long as the mix remained workable. During the last 30 years or so gravel aggregate has been very extensively used, this material being easily won and involving comparatively slight crushing costs very much less than for quarried stone. Another great advantage is that if gravel lies under water it can be pumped and washed at the same time. Most gravel can be either pumped or excavated, whereas all rock has to be blasted before it can be handled and fed to the crusher.

One of the most important problems facing the user of concrete, particularly in the architectural field, is the treatment of exposed surfaces and during recent years much attention has been devoted to this important subject. For example, treatment with sulphuric acid gives the same effect as natural weathering, and spraying with water mist is another method of attaining the same result. Tooling of the surface is a masonry technique and can today be carried out by means of suitable electric portable or compressed air tools, the methods being fully explained in any good text book on concrete.

Economic erection and support of formwork and shuttering has always presented a problem of some difficulty in concrete construction, and efforts have therefore been made to employ precast concrete slabs as formwork, a notable example of this technique being provided by the Dorchester Hotel, London, erected in 1931 to the design of W. Curtis Green and Partners; Considère Constructions, Ltd., were responsible for the structural design and the contractors were Sir Robert McAlpine and Sons, Ltd. Today, nearly twenty years after erection, these slabs have the appearance of a naturally weathered surface.

McAlpines were also responsible for an interesting new development in construction when they built the Civic House, Kensington, to the design of Major A. S. Ash, F.R.I.B.A., employing a reinforced concrete framework partly in precast concrete units and partly with concrete cast *in situ*; this method was evolved since the end of World War II, its objectives being to use minimum skilled labour and to reduce the cost of formwork. The employment of two Monotower cranes with this system did much to speed erection, and it has been claimed that the method is about 30 per cent cheaper than if structural steel framework be used where such framework has to be encased in concrete.

Between 1939 and 1942 the offices and showrooms of the Croydon Gas Company were built with precast concrete slabs as the formwork and permanent facing to a reinforced concrete building. In this case the colours of the slabs were varied during manufacture, and acid treatment was applied to the face of the slabs to give them that degree of roughening which would faithfully imitate natural weathering.

Architects have taken full advantage of concrete in the sense that it can be moulded into curved forms which give ample scope for architectural expression combined with structural excellence, and we see a very fine recent example of this in the Newbury Park Bus Station of the London Transport Executive, designed for the latter organization by Oliver Hill, F.R.I.B.A. and built by Higgs and Hill, Ltd, the consulting engineers being Considère Constructions, Ltd. It consists of a hangar 150 feet long 30 feet high, and has seven very striking concrete arches which span 60 feet; it has a concrete roof, finished on the inside with red-brown paint, and surfaced on the outside with sheets of copper.

The great arched ribs of this fine structure appear gold in the sun with the warm colour of the Chesil Beach shingle used for the aggregate of the concrete. The clean simplicity of this building is extremely impressive and it shows what can be done by an imaginative use of concrete; every part of the structure performs its function and there is not a single item of decoration to detract from its pleasing aesthetic effect.

In Sweden some remarkable concrete bridges have been built in recent years, and here again we see the tremendous architectural scope in this field of construction. In 1934 the Traneberg bridge held first place for length of span; today the Sando bridge is the longest concrete arch in the world, spanning the truly amazing distance of 867 feet in a beautiful sweeping curve which gives the effect of lightness and grace probably not attainable by any other means. This structure provides a navigational clearance of 131 feet and has been designed as a fixed arch of box section; the decking, carried on three girders, is supported by slender columns of reinforced concrete which further demonstrate the graceful effect which can be obtained by suitable design.

The Klockestrand bridge is another very impressive structure and is a continuous girder bridge, built as three clear spans with approach viaducts and consisting of three longitudinal girders. An initial compression was introduced into the concrete by 84 steel rods placed between the girders and anchored in the deck of the outer spans. One of the country's newest bridges is the Svinesund bridge, opened in 1946, which spans the Ide Fjord between Sweden and Norway. It has a total length of 1,378 feet and comprises a central concrete arch with a clear span of 509 feet, with approach viaducts formed of six arches on the Swedish side and two on the Norwegian. It is a very graceful structure.

A very graceful bridge in Scotland is the New Spey Bridge, built in 1931; this is a single span three-pinned reinforced concrete arch with a total length of 372 feet 6 inches, the exposed concrete surfaces have been bush hammered and the concrete itself is of special coloured mixture. It was designed by Blythe and Blythe and constructed by Melville, Dundas and Whitson. Here again we have a very fine example of the architectural versatility of concrete, for by suitable treatment this bridge matches in perfectly with the winding river and rolling hills.

In recent years concrete has also been widely used for many structures of exceptionally large capacity, apart from buildings hotels, offices and flats. For example, an immense grain elevator programme has been carried out in the Argentine Republic. Rosario, second largest grain port in the world, alone ships 40 per cent of Argentina's entire grain production. Here a 75,000 ton grain elevator was completed in 1949, which can receive 6,000 tons of wheat a day and comprises 123 main storage bins 98 feet deep of cylindrical construction.

(*Continued at foot of page* 86)

1900—building workers—break for refreshment—nice hats.

BUILDING MATERIALS AND TECHNIQUES 1900 to 1950

By J. K. Winser

1950—building workers—break for refreshment—nice girl.

ANY notes on the Development of Building Materials over the last 50 years seem to require a preliminary comment on some of the economic changes which have occurred. If we allow the period to start before the dislocation due to the South African War, we are not far from the heyday of the Forsyte belief in the desirability of "Bricks and Mortar" as the ideal investment, save only the Consols. In most years and with only irregular fluctuations, there was a steady flow of capital from both large and small investors providing as it does today housing and hotels for the well-to-do, factories, hospitals, shops and pubs for all classes and, in addition, vast areas of unsubsidized terrace dwellings to rent. Rents were sufficient to cover interest and capital retirement generally reasonable maintenance and in many cases a profitable surplus in addition, and not only the black coated worker, but also the artisan and the better off labourer could, or did, afford those rents. The volume of this housing was sufficient to affect the whole structure of the Industry. The prosperity of the Bath Stone Quarries depended more on standard sets of window dressings for villas than on bespoke mansions for the rich or the local demand for building stone. The London stock brick trade was founded on, as it built, the terrace house. The inherently seasonal nature of both building and brick-making was to some extent cushioned by the steady extension of the speculative rented suburban house which absorbed material and labour between the seasonal bursts of contract activity.

Comparisons of price levels, wages and material costs are inevitably misleading for standards of accommodation and construction have also changed, but the period starts some ten years before the £100 house competition so that sets the pattern of cost of the small house. Incidentally, I have lived in one of the houses built to plans entered in the competition and it was not altogether unsatisfactory. Labour was relatively cheaper than material so that more natural stone and slate, carrying a high labour factor in its production could be used. Above all, timber from the Baltic was good, cheap and abundant. One isolated instance shows that hourly labour rates have advanced six times the earlier figure, while timber is up from ten to twelve times, and is of a far lower quality.

Then, as now, the largest item in the annual output of buildings was housing and comparisons of normal specifications show really surprisingly little change, far less than in the case of flats or office buildings.

EXCAVATION

For domestic structures the whole of the excavation work was by hand even where there were cellars, and removal of spoil was always by barrow. On the largest city jobs steam cranes with hand filled skips were used but since the spoil had to be taken away in 1-cubic yard tip carts, the cranes did not greatly speed up the work and were only justified where the excavations were too cramped to allow a ramp to be left to the lower levels.

Site excavation for housing and small building work is really extraordinarily difficult to mechanize—the smallness of the areas and slight differences in levels make any form of present day plant uneconomic unless the straight forward terrace layout could be brought back into fashion, when it would be relatively easy to use road grading and slab laying techniques with relatively large savings. The only other proposals to overcome the cost of preparing foundations for small irregularly placed buildings would be the use of a central or a limited number of peripheraly placed piles supporting a slab. The piling could be mechanized and standard self-levelling forms would make slab laying far cheaper than present practice. These, however, are still visions of the future

(Continued from page 85)

The buildings have a total length of 600 feet and the working building at one end is 200 feet high. Two-thirds of the above quantity of wheat is received by rail, the rest by road, and the installation can ship out 9,000 tons a day, loading four vessels at a time. It would appear that concrete provides the ideal form of construction for this type of building, and some idea of the grain handling problem in Argentina is provided by the fact that although the country exports about 12 million tons a year of wheat and maize, storage at the ports only provides for about half a million tons.

Reinforced concrete shell roofing is another comparatively recent development of great value to large structures such as power stations and gas works. At the new Skelton Grange power station of the City of Leeds, for example, this type of construction is found to be ideal for the turbine house, where height and clear span are the two most desirable features; in fact, it is surprising to learn that this is the first occasion on which this form of construction has been applied to power station work in Great Britain, although it has been widely used abroad.

The main turbine house is certainly one of the most impressive modern reinforced concrete structures that can be found. The massive concrete supporting columns, which are made slender in appearance by their exceptional height, are 60 feet from ground level to the crane rail. From the latter level they continue to the roof springing, making a total height of 88 feet; this building will eventually be 800 feet long, and the larger part of it has now been constructed. This section is 440 feet long, divided into 14 bays, its roof spanning a width of 74 feet; each column is 5 feet by 2 feet 6 inches and is spaced at 31 feet from the next column, each connecting at the top with one of the main arch ribs. These ribs are of outstanding structural interest, being 16 inches wide, 6 feet deep at the crown and 2 feet 6 inches at the supports, yet the thin shell roof itself is only 3 inches thick at the crown. Expansion joints one inch wide are introduced in the roof slab at intervals of 93 feet, and intermediate ribs occur between main ribs The crane beams that run for the length of the building carry a 150-ton overhead crane and are 5 feet deep and 2 feet 6 inches wide. Consulting engineers for the whole undertaking are Merz and McLellan, with whom Sir Alexander Gibb and Partners are associated for the building and civil engineering work; R. A. H. Livett, O.B.E., A.R.I.B.A., City Architect of Leeds, has acted as consulting architect.

These are a few of the many widely different applications of concrete in its different forms, which indicate the progress that has taken place in the design and construction of reinforced and mass concrete structures. Prestressing is the most outstanding technical development in concrete of our time, but like all new techniques there is a regrettable tendency to regard it as the panacea to all design problems, whereas in fact it should be considered as a complementary material to conventional reinforced concrete. There remains a vast field for research and experiment yet to be explored.

and the foundations for house building are still got out as they were 50 years ago. The wage cost, however, has increased about ninefold. Not much to boast about. On larger work the mechanical shovel with steam rather than diesel power was in use on some if not all jobs 50 years ago. The bulldozer and all forms of scraper grader and dumper are new. They certainly speed the job, but they do not cheapen it so much as might have been hoped as capital and maintenance costs are so unexpectedly high. Another vision of the future is the successful development of non-metallic track. Experiments under farm conditions are extremely promising and suggest double or even much greater track life.

CONCRETE

Although Portland Cement was well known and used for ordinary building, concrete—without prefix or suffix—was lime concrete. Grey stone in the south and lias or similar hydraulic limes in the west and midlands were used for almost all foundations and floor slabs. Properly handled by skilled labourers the results were tough, free from cracks and reasonably water proof. In many ways a better job, for it never got too hard, and there was a degree of flexibility or give and take that seems to have some merit. Modern building is often too rigid, hard and continuous. Aggregates were more often brick than they are today, and with limes their pozzolanic action was, perhaps unconsciously, made use of. Again such aggregates produced a softer, more fireproof, less sound transmitting type of structure than the Portland Cement flint aggregate we use today. The provision of clean graded aggregates is, however, a completely new and highly important development during the period. The next 50 years will see further development here for available gravel deposits are diminishing rapidly. Artificial aggregates, of varying unit weights, made from heat treated clays and slags will inevitably take most of the market, for in addition to wider availability in the south and west they have many technical advantages. Crushed rock aggregates are increasingly being used where geological conditions permit and it is interesting to find one firm already producing its own "Sand" from limestone; a wholly machine-made product and not the by-product of another process; in order to ensure a technically accurate size grading.

Turning from domestic buildings where changes in the use of concrete are little more than the substitution of reinforced beams for the wooden bresummer or brick relieving arch, to large scale units we find very much more change. Almost the whole development and practical application of reinforced concrete has occurred in rather less than 50 years. True, some early examples are known before 1900, but the great bulk of the development has been within the last 40 years. Prestressing is, of course, still in its infancy so that the next 50 years will see even greater advances. How far this is wholly an improvement over brick or stone can, I think, still be argued. Mass concrete, used so extensively on the Southern Railways shows more cracking and surface change than the far older brickwork on, for instance, the Euston Line. The very continuity of concrete makes it difficult to provide expansion joints to take care of thermal and moisture movements. The problem of really long lasting surface finishes too remains to be solved. Continental practice has shown the way, bush hammering and mason finishes can provide good texture and colour, but they are not cheap and with silicious aggregate they tend to get very grey and cold looking in industrial atmospheres. Limestone aggregates weather a little cleaner, but for some reason even Portland stone used as the aggregate looks dreary after a few years compared to the beauty of the far dirtier Portland stonemasonry in, say, St. Martin's in the Fields Church. This problem remains to be solved and so far there is no indication of the lines which should prove useful unless we can induce the owners to accept the Regency view that regular repainting is worth the cost. The Swiss, with even their high wage rates can and do afford it.

MASONRY

The last 50 years has seen the virtual extinction of stone building as the normal method even in the wholly stone areas. True, there are innumerable attempts made to revive its use, even the Ministry of Health sanctions extras where stone is used and an economic case can be made where there is a long brick haul and the local stone occurs in suitable forms for easy quarrying and laying. However, the revival always has a smell of artificiality. Most of the older and more interesting local quarries are shut, the skilled men dead or dispersed, and many feel that only a small further rise in wage rates will finally kill the trade. Used as it has been and still is by revivalists, no mechanization can be introduced, whereas every brickyard can be further mechanized to offset each new wage rise. The only hope would seem to be in an attempt to mechanize a quarry to produce a series of ashlar sizes which could be handled like brick; with quoins, closers and all the essential "fittings" designed to a suitable modulus. The deep bedded freestones could be handled in this way, but whether architects would accept the idea sufficiently cannot be foretold. It would entail a rather rigorous design discipline but not much more restricting than rather unconsciously accepted when brick is used. Unless something on these lines can be made to work, the future of natural stone looks like being limited to the city of London and a few provincial banking and insurance headquarters. It will remain the standard of opulence to which all will aspire, but that may well be its death warrant in the Welfare State. The small areas of rustic stone-facing beloved of the Continental Schools of Architectural thought are insufficient to keep the trade alive and are showing acute signs of a preference for fieldstone and second-hand salvage following recent American precedents.

1913. Steam cranes at work on the site of the Cunard Building at the pierhead Liverpool. Note in the left hand corner the scoop and barrow.

ROOF COVERINGS

Fifty years ago in almost any industrial area and in rural areas west of a line Bridport to the Wash the normal roof covering was slate. The main producing area was, of course, North Wales, but at that time supplies were still coming from the smaller quarries —not only those still well known in Cornwall and Westmorland, but many others. Greens from Precelly and Tyrch in South Wales, a grand rough grey from Lancashire, and a rusty black from Devon (not perhaps one which would stand up to the B.S. Test but always dark in tone and so useful from the design point of view). The textured blue Swithland slate in Leicester and the black with silver markings from Argyle ; Yorkshire flags and Horsham healing stones, Cotswold tiles and oolitic tiling stones in Dorset were all still in production. The larger quarries are today producing far fewer slates and the smaller are mainly closed. In practically every case one can say that it is a real loss from both appearance and technical aspects, but it became inevitable with the increase in wage rates; for slate production can hardly ever be fully mechanized.

In its place the plain tile reigns almost throughout the Kingdom. Surely one of the most unexpected developments, for it is heavier, requires a much stronger and more wasteful roof pitch and considerably more timber. Reduce the pitch and both life of tile and waterproof qualities are ruined. Fifty years ago the pressed Brosely tile was just spreading from Staffordshire to the south, an example of the effect of mechanization without adequate knowledge for their life was never really good enough and to our eyes their smooth arrogant red is intolerable. Unintentionally they did much to stress the virtues of the good hand-made, full plastic tile whether made in Staffordshire, the Midlands or the South. Still further mechanization of sand faced full plastic clay tile production seems difficult and largely because it can be fully mechanized the concrete tile too often, complete with dab of shaded colour in one corner to simulate the fire colour of a clay tile, is now a serious competitor. It still remains an irrational shape, a heavy tile requiring double cover; and a pitch of 45 degrees or over is unreasonable. Post-war austerity has, in this instance perhaps alone, increased the use of a more rational design, the single cover interlocking tile, more often than not made of concrete. Why most concrete roofings should have to be coloured to simulate a quite different material is one of the mysteries of the building industry. The more logical greys and buffs look well, cost less and give a cooler roof in summer. No one ever suggested that a Cotswold stone roof ought to be stained a bloody red, but there it is, we must record the odd fact that in 1950 almost all concrete roof tiles still try to look like clay.

Of other roofings, asbestos cement has been developed entirely within our period. In its early years, in the form of diamond slating it was the first real competitor of slate for the cheapest roof so that a "pink asbestos bungalow" became a symbolic term for the worst of uncontrolled building. In corrugated sheet forms it is

The between war diamond pattern asbestos slate roof has given way to the more elegant corrugated sheet.

now the normal covering for factory roofs, taking one more of the main outlets for natural slate, and almost ousting galvanized corrugated iron. For long a brittle material incapable of standing shock and localized pressure; improved and reinforced types have at last been introduced.

Both laminated and mastic asphalt roofs were in use 50 years ago, but there has been considerable extension in the use of composite roofs consisting of a layer of insulation, a waterproofing layer of impregnated felt laid in bitumen and a traffic bearing surface, usually white in colour to minimize transmission of solar heat. The almost universal use of flat roofs for large city buildings has, of course, meant a great increase in this trade, and the desire to make use of the roof for recreation and escape has encouraged types with good wearing qualities as opposed to multiple felt types without tile or slab finishes used in other countries. The hope has often been expressed that it would be possible to use the structural concrete without any bituminous waterproof covering, but this obvious development must be left for solution in the next 50 years.

Several attempts have been made to improve on galvanized corrugated steel sheets as a roof covering mainly by providing strongly adherent bitumen-impregnated felt or rubber based finishes to black sheet. Two at least of these have remained on the market and have the advantage of great flexibility and resistance to impact.

PLASTICS

At one time it was thought that plastic sheeting of various sections would take most of the external cladding market, but the relatively high cost of the raw materials and of the plant needed for moulding and curing has made this impossible for normal building although it has many advantages for caravans and portable buildings and of course for internal fittings and counter work.

The great exception to the lack of wide application of plastics to building structure has been the use of transparent Perspex for roof and wall lights. Of very high light transmission characteristics, light, non-brittle, and easily moulded, it can be applied to corrugated roofs without a frame and this omission makes its high unit price acceptable.

FLOORINGS

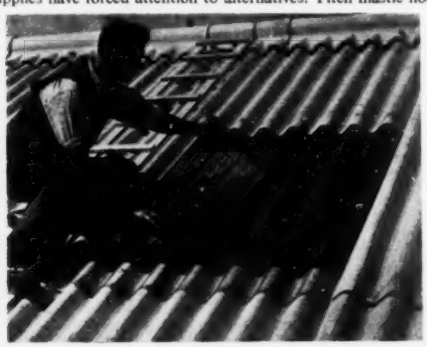
Development in the last ten years has been more conditioned by consideration of the problem of finding substitutes for wood than by any other factor. Domestically and for most other buildings, one sort of wood or another is and perhaps always will be the ideal floor. The disproportionate increase in price and the shortage of supplies have forced attention to alternatives. Pitch mastic floors are an unusual example of a material developed consciously—even, in fact, under close Government control and encouragement, to provide just such a substitute. Unknown or unused before 1940 they are now widely used for local Authority Housing. Coloured asphalt floorings were introduced some 10 to 15 years earlier.

The first patents for the so-called Jointless or Magnesium Oxychloride floorings were taken out in the last century but their main expansion in use was after 1900. The need for close technical control in laying was not realized, and small firms working with little capital and no chemical knowledge put down floors which dusted and cracked so badly that the material got an unreasonably bad name from which it only recovered in recent years with the introduction of a responsible code of practice. The slow setting, over burned, gypsum plaster floors were another form of jointless floor which was used in the Midlands in the 1900's but which went out of use owing to the long period required for laying and hardening. A good floor apart from this snag, and the need, as with jointless and mastic floors, to ensure regular and proper maintenance.

Linoleum, now unfortunately relatively dear and in short supply, owing to the need to use more linseed oil for foodstuffs, was, of course, invented long before 1900, but it was then used mainly as a covering for secondary parts of the house—children's nurseries, passages and less exalted bedrooms. The better qualities, however, have been used more and more for high grade technical floors—almost the standard for hospital work in Germany—and in tile form for most of Lyons premises where carpet would not be suitable. Long lasting, of good colour, warm, sileat and non-slip, it is hard to beat on technical grounds for few others combine so many favourable factors.

Rubber flooring was something of a novelty in the 1920's and in their early enthusiasm some firms took contracts with inadequate knowledge of laying techniques so that too many cases of creep and failure of adhesion occurred. Its use was reduced by this and by the wide fluctuations in prices characteristic of all rubber products. The market has been controlled more by the scarcity or abundance of rubber and its price than by its inherent qualities which are excellent for many purposes.

Cork tile consisting of pure compressed cork without other addition was known more than 50 years ago, but its use for flooring did not come in for a further 20 years. One of the most long wearing surfaces after rubber it is surprisingly non-slip whether wet or dry, polished or washed. Again its use is controlled by price and availability of the raw material rather than by technical qualities of the material.



Perspex—which needs no frame—justifies its high unit cost.

Flat roofing on the new House of Commons building.

Wood floors, boarded, block, end grain, parquet and plywood, whatever the form, seem to remain the standard by which all others are compared, and the one demanded by the housewife and building owner. How far the strength of this demand is wholly logical and how far it is a matter of tradition and fetish should be investigated for it seems that we shall never again have the unlimited supplies of timber at low prices which were possible 50 years ago. The sources of supply are dwindling, the areas of easy access are exhausted and the big reserves in European Russia will be needed for local use even if international trade is freed. German destruction of Russian buildings has inevitably cut her exportable surplus for many years to come.

The period has seen a further reduction in the width of floorings from 9 in. in the early 1800's to 7 in. a hundred years later and 4 in. to 6 in. today. A comment on the forest conditions from which the boards are cut: but whatever the width, what a satisfactory floor to live with ! There is a greater range of hardwood block and strip for flooring with the opening up of tropical Africa and America, most of them of good quality if not quite up to teak, but few can afford the timber for a true parquet floor on a wooden diagonal counter boarded base in these days, and the use of plywood flooring pushed so ingeniously by Jack Pritchard in the 1920 's is now dwindling; not through any fault, or even cost and shortage of plywood, but because of lack of boarded floors in new buildings on which to lay it.

Wood block flooring for street paving has given way almost entirely to asphalt macadams, and the excellent proprietary end grain block floors introduced after the first war for industrial use are now ruled out on grounds both of price and availability, apart from quite exceptional technical uses.

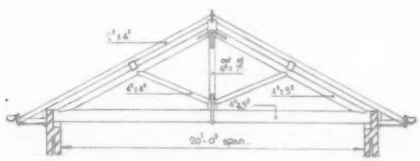
STRUCTURAL TIMBER

Of all the changes which have taken place, the timber shortage has caused most difficulty. All our traditional building was based on good supplies of cheap timber which was used lavishly in both structure and finishing. In 1900 good building timber was to be had on site for £7 per standard or less. Today it is perhaps £70 or more. Admittedly it was used extravagantly, but structurally this was necessary until some form of stress grading should come into regular use. Every by-law, and even common sense, forced the use of excessively heavy timber sections in case a poor piece should coincide with a maximum load. The importance of stress grading and the consequent possibility of close design based on strength and not habit cannot be over stated. Indeed, unless we can get some such scheme adopted throughout the trade, timber shortage will remain the limiting factor controlling house production no matter what political promises are made, nor what price is paid for the timber for world demand for forest products in structural timber, pitwood and pulpwood is increasing too rapidly. The Building Industry now at least knows how to reduce the timber content of a building, but it will be a big educational problem to get common acceptance. It is not enough merely to put in thinner sections and leave "the structure as before." That has been tried and the resulting sagging roofs already show the mistake after very few years.

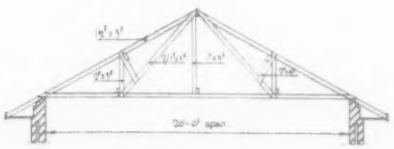
Joinery has been more fully mechanized than any other section of the trade. Fifty years ago doors, windows, shutters were still hand made, at least on architect controlled jobs. Quite often the first job was still to set up a joiner's shop on the building site, and the joiners were taken on at the same time as the bricklayers. The machine made job is cheaper, and when well done often better, but it is more difficult to get good joiner fixers and any alteration and site work is more troublesome today. Double hung sashes, folding shutters, panelled linings on framed grounds have all given way to simpler forms, except in the most monumental buildings.

Sheet steel door and window frames are a relative novelty with but 15 or 20 years' experience, and are likely to be used to an increasing extent as timber gets shorter. Metal windows are, of course, much older than our period, the flat smith made casement going back to mediaeval times and the cast iron to the early 18th century, but the present rolled steel section having two lines of contact and a wide weather groove between became oppular only some 40 years ago, when its advantages over earlier types led to side use. A somewhat similar theory applied to wooden casements with very light sections was introduced from Switzerland in the early thirties and seems to have been the forerunner of today's standard E.J.M.A. window.

Attempts between the wars to make standard internal and external cill units in plain and enamelled slate, glazed coloured faience block and copper or zinc sheet seem not to have taken root as might have been expected. The heavy brick on edge cill is as technically bad as it is coarse in appearance and far too much time is spent and far too many failures occur in finishing cavity walls round windows and doors.



Traditional King Post Truss.



Modern Trussed Rafter.

Lessons learnt in the stress grading of timber have produced economies in the use of a now precious material as the two diagrams above show. Above are shown the old and new ways of spanning 20' 0".

CEMENTS, LIME AND PLASTERS

While Portland Cement belongs to a much earlier period, the main change from lime for wall bedding mortar only occurred after the first war. Until then lime, usually delivered as lump and run on the site was standard practice for both brick and stone work and for plastering. Its decline arose partly because of the trouble of slaking, but more because with improved transport the radius of delivery of a particular lime extended beyond the area in which its peculiarities were well known. No two limes slake alike and as a result failures due to misunderstandings arose too frequently. The delay in drying out of three coat work was also a contributory factor. In the Midlands and North the normal mortar was black pan mill stuff; again a very economical material, using waste ashes and providing a fat working mortar, the main objection to which was its colour. Today's cement and sand is not much better for its job and is more costly.

Wall and ceiling plaster 50 years ago was mainly lime with the exception of the most expensive work and a few areas in the Midlands where gypsum plaster was preferred. Between the wars the speculative builder found lime too slow setting and either two coat gypsum plaster or gypsum over cement rendering became more common, providing a rather resonant and condensation prone surface. Even between the wars much ceiling work was still wood lathed—the only way 50 years ago, but today this is almost extinct, although metal lathing is still used and split or riven lathe, which was both stronger and gave a better key was still available until 1939. Practically the whole of the trade is now done in plaster base board with a single skim coat of gypsum. Such a ceiling will never fail, is quick to put up and dries almost at once. This is surely one of the real advances in technology so long as world supplies of pulp make it possible to manufacture sufficient board. Another casualty during the period was the precast plaster slab used as a plaster base, and also in thicker units as a wall block. Probably they were less convenient than the board, but good ceilings could be put up in that way. During the period much of the mystery associated with these plasters has been exploded by the Building Research Station. The generic terms then applied to varying types of gypsum plaster have been defined, and the various types suitable for each specific job categorized so that there is no longer any need for mistakes and failure.

Roman cement has now, unfortunately, almost disappeared from the market which is a pity for it made a good basis for painted finishes and was unrivalled for repairing stucco. Aluminous cement is a relatively new product, selling mainly for foundation work in soils containing sulphates. Unfortunately its price is high, for it would otherwise have much wider applications both as a refractory and for glazed wall linings and trim since it can be cast with a polished surface needing no further treatment and with virtually no shrinkage in setting. It is also used in plastic rubber floor mixes.

For specialized work such as chemical and food factories aluminous cement, and certain bitumen containing compounds have been successfully developed to withstand acid conditions and are superior in many respects to the older Yorkstone, slate slab, or blue brick paving.

In external pavings it is now, unfortunately, rare to find natural stone, whether York or any other, used except on monumental work, granolithic or precast concrete slab being the rather dull looking cheaper substitute.

The many coloured tesselated tiled hall and servants' quarters of the 1890's gave way first to plain red and heather quarries, and

have now fallen still lower to little more than a cement screed with perhaps a pitch mastic finish.

Wall tiling has, from the technical aspect, changed not at all, but it would be possible, with little difficulty, to date any particular tile within say 10 years solely by its colour and texture. Probably no other building material shows so clearly the changes in fashion. Decorated tiles are now hardly used at all, which is perhaps a pity for there is nothing inherently wrong in repetitive pattern, and much that is depressing in today's preference for a mottled tile is any colour so long as it is muddy. The Spaniards and Dutch produce good plain coloured tiles which always look clean and fresh and it is a pity we cannot follow their lead on a much wider scale.

GLASS

The main changes in glass have been in methods of production—plate and sheet—cathedral, colours and flashed opals, obscured and sand blasted are all over 50 years old. In use the main change is in a lack of courage in design. We just do not now use etching, gilding, sand blasting and brilliant cutting as the Victorians did. Those who remember or know the Old Horseshoe or the Rose of Normandy, or best of all the pub between Jermyn Street and St. James Square, will see what I mean. It is not in our taste, and it would be too expensive but at least is full blooded and it should be possible to create a modern idiom which could take advantage of the life and sparkle of glass. A window that might have come out of a bank, with a two-toned acid etched border is somehow too anaemic for a pub or a theatre.

The use of opal glass $\frac{1}{4}$" thick as a wall lining was developed in the last 40 years and so soon as satisfactory bedding mastics became available large areas of wall linings in sheet and ashlar sizes were possible.

Two further recent developments are important—the invention of the Fourcault continuous flat drawn sheet process in Bohemia, which produces a fine polished sheet from the thinnest up to $\frac{1}{4}$" full. Supplies became available in this country in the early 1920's although the process was not used here until much later. This thick sheeting was very useful for sound proof glazing where the cost of polished plate was considered excessive. Much of this flat drawn glass exhibits a very slight parallel wave, but if it is glazed with the wave horizontal the distortion shows very little so that it is a great improvement over the older cylinder process sheet.

The second introduction was a toughening or armourplating process by which, more particularly the thicker sheets, could be heat treated to become stronger and far more resistant to impact. The theoretical knowledge of the possibility is very old, but its application to sheet, plate and drinking ware is relatively new.

Wire netting reinforced plate is fairly old, but the square wire mesh "Georgian" pattern is a real improvement of the 1920's.

Moulded glass for pavement lights was, of course, known more than 50 years ago, but its use in lense form in conjunction with reinforced concrete was mainly brought about since 1920. Moulded glass bricks were coming into use at about the same time, but all the problems with this application are not yet solved, and before its use is very widespread, means of reducing costs must be worked out.

Ever since the turn of the century the price of glass has been very low in this country. At one time the crate was worth more than the content of Belgian sheet. The increase in price has, therefore, been more pronounced, especially in the last 15 years than in most other basic building materials, except, of course, timber.

Fifty years ago most roof glazing was done on wood bar, either puttied in or with a screwed on cap. Steel glazing in a plain tee was also sometimes used, but both were almost impossible to maintain and greatly restricted the use that could be made of roof lights, except at very steep pitches as in a north light truss. Even then pessimistic designers generally put a little gutter along the lower edge inside the roof, explained as necessary for condensation! The lead sheathed steel bar, generally of fairly complex section, now makes a drop dry rooflight a certainty. Aluminium bars were introduced about 25 years ago and can claim equal advantages with regard to water proofing and at the moment lower prices.

SMALL SITE PLANT

Site preparation has been referred to previously, but reference has not been made to the smaller plant. Mortar and concrete were usually hand mixed on building sites until after the first war. Anyone working then will remember the specifications requiring turning so many times dry, so many wet, the use of the rose on the water can, and so on. Even on road contracts in London mixing gangs were common until 1925. Today even the smallest job has a tilting drum mixer, and where any quantity of work is to be done batch weighing plants are common. Oddly, the delivery of ready mixed concrete has not become as common here as in America. Possibly our sites are less congested, while our street congestion makes time scheduling less easy, but it is a logical method. In the North where pan stuff was common, ready mixed was long the custom and has grown less common.

Until the first war all scaffolding was tied pole work, except for the wooden Masons' staging in cities over the footpath. Now only tube scaffolds are seen and I was quite surprised this year to see a small job with new pole work. I, personally, would rather put up a pole job with wire lashes, but the cost of retightening every hemp lash each time the weather changed, or redriving the wedges, would today be quite uneconomic. Another ten years will probably see the end of steel tube in favour of the more easily handled light alloy and will certainly see greater use of prefabricated units instead of nothing but the plain pole and clip. It is rather surprising how long it took to start making up standard units with clips welded on, none of which appeared until perhaps 25 years after the first use of tube on a grand scale.

Small mechanized hand tools have only made headway on the site in the last five years. Before 1940 a hand circular saw or motorized plane was very rare. Mechanical grinders and polishers, both for terrazzo and wood floors only became common in the latter half of the period. Up to 1925 it was normal to see Italians grinding and polishing with weighted carborundum rubbers on long handles, even on big contracts.

Paint sprayers and pressure fed paint brushes were rather more quickly introduced, but the majority of house painting work is still brush applied. Mechanical asphalt mixers are fairly common now and it is rare, on larger jobs, to see a man stirring the pot, always a hard job and one which could not be done half so well by hand as by power.

The hod carrying labourer is today another rarity even on the smaller job. Hoists and elevators became common of bigger work some 25 years ago, while mechanical cranes were regularly used long before 1900.

Site welding of heating installations became fairly common after about 1930, but it is surprising how much is still screwed. The problem of supervision and testing is probably the reason for slow acceptance.

It is necessary to add perhaps that this rather unenthusiastic comment on site mechanization would be more optimistic if it had been approached from the Public Works rather than from the house building aspect. The handling of bulk materials is a problem far more easily solved than the erection and finishing of the great variety of fittings needed for ordinary houses.

HEATING

The typical heating installation of 50 years ago was undoubtedly the low pressure hot water system, often run in cast iron pipes of 3 in. or 4 in. diameter with a saddle boiler, with flues formed in brickwork. The efficiency was low, it was liable to fearful damage in frost should the fire go out, but labour and fuel were cheap so that risk was perhaps not great, and from the corrosion standpoint it was almost everlasting. Methods of calculating heat loss were haphazard, but the system worked and contract requirements to reach and maintain a given temperature were easily attained. Joints were generally caulked and run in blue lead, but sometimes the old rust joint of salammoniac and iron filings was still used, defying all known methods of removal for alteration. Low pressure steam in wrought iron pipe was also common and in a few cases sub-atmospheric steam was thought highly of, based on the argument that any possible leak could not cause damage to the building or goods in stock; perhaps a comment on the risk of cracked cast iron installations which were more familiar.

Another system, less used, if used at all today, was the high pressure scheme run in extra heavyweight hydraulic steel tube, using left and right hand threads. The circuit was completely closed, but had a small air reservoir at the highest point. A coil of pipe formed the boiler which must have been of high efficiency. The running temperature was liable to be very high, and in some installations, notably one in a concert hall, air bubbles when first firing up at the beginning of the season made a series of bangs only equalled by battle training fireworks in the 1940 war.

The use of acceleration was rare until 1920, and to allow for gravity circulation feed mains were larger than is today common. Embedded panel heating came in during the early twenties and did much to speed the use of welding techniques. Until then, screwed work had, of course, been universally used for steel and cast iron pipe.

On large buildings various systems of plenum heating had come in just before the turn of the century, but, until the electric motor was available to drive the fan, there was a good deal of difficulty on the mechanical side. For the same reason ventilating systems were rare and rudimentary. In theatres where something was essential a common practice was to provide an outlet in the roof over the stalls with, in some cases, a sliding panel which was opened during the intervals—a great excitement for the country child brought up for the annual pantomime or the more rarified atmosphere of Shakespeare and Opera. The evening was in my case quite spoilt when rain prevented play. I had almost forgotten the Corona of batswing gas jets used to accelerate the upcast.

How they were lit at that dizzy height I never could discover.

Another ventilation device used in every Church Hall and today as rare as mutton chop whiskers was the Tobin Tube. This, with a roof ventilator, was standard practice in every school room and Church hall. It certainly made the draughts less noticeable but ventilation was still variable and dependent on external wind conditions. Heating in such buildings was generally by a large coke stove, the famous Tortoise brand being typical and going back well into the nineteenth century. Specialist firms made highly Gothic editions for Churches and the more religious buildings. At about the same time the true convection stove, with a fresh air inlet from outside and a convector casing, became common and in a few cases School Board buildings in Westminster, for instance—an ingenious convector drew its fresh air intake from the corridor, a principle much heralded as a novelty in 1945.

Domestically the open fire was as universal as it was in office block, hotel and Government Department. The development of coal fired appliances is dealt with elsewhere in this issue.

Gas fires, very often little more than a series of jets playing on fireclay units in an existing grate, were quite common before 1900, but any mass use of this method of heating came in this century. Efficiency remained fairly constant once the candle type radiant was introduced until comparatively late in the third decade.

Gas heated boilers for central heating were coming in before the 1914 war, but electrode boilers using off peak current only became feasible with the extension of promotional tariffs in the 1920's. The domestic "Geyser" gas fired, often out of adjustment, and terrifying to light was well known by 1900 and changed very little until the introduction of Continental types in 1921.

LIGHTING

I am not certain that the most far reaching occurrence in the realm of lighting has not been the development in the last 10 or 15 years of methods of measurement of light intensity on the working surface, and the adoption of functional codes of good lighting practice. Methods of lighting have, and will again change, but there has never been a sound basis of design covering "how much" and of "what quantity." Of all the changes in building technique, the rate of development of illumination in the last 75 years is easily the most rapid which has affected the building trade. Details of that development are given on another page. The only comparable item is, perhaps, bell hanging. Fifty years ago to install a system of bells meant pull bells, and long after they went out of regular use the bill of quantities still showed the specialised electrical work under the heading "Belhanger." I've not heard the phrase used for the last ten years, and to find a skilled bell hanger today would be impossible, and it was a very skilled, or at least, tricky, trade. Probably only a few of the oldest hardware-men could today find any bell cranks or springs stored away at the back of the stock-room.

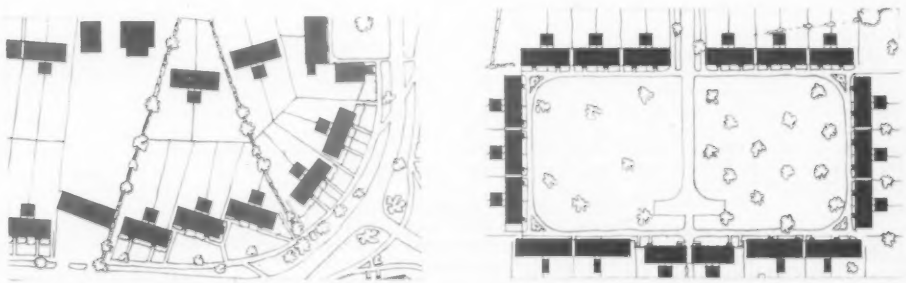
STRUCTURAL THERMAL INSULATION

Structural Thermal Insulation used consciously in the technical sense of today's practice is less than 25 years old. The first popularization of the idea undoubtedly came from the concentrated sales effort to increase the market for the thicker wood-fibre wall boards. In the early 1920's every Architect's office was flooded with highly "technical" literature urging us to wrap everything we could think of in wall board, and proving conclusively that neither pigs nor poultry, water tanks or children's nurseries could exist without one or more layers of this or that boarding. With this as a background, and the post-war shortage of fuel, to say nothing of its cost and the entreaties of the Ministry, there has been a fairly general acceptance of the need for thermal insulation. Its application has been less general since housing costs have been cut so severely and in most cases little has been done other than to substitute breeze block for the inner brick of a cavity wall in an endeavour to reach a "U" value of 0.3. This, however, illustrates the point that "applied" insulation is limited to specialized buildings and is developing slowly, while the market for structural materials of high insulation value and low cost is wide open. The thicker wall boards mainly introduced after 1921 are today used widely for lining corrugated steel and asbestos sheeted buildings, few of which are not insulated if they are to be heated. Wood wool/cement slabs, which came in rather later, and in no quantity until after 1930, are widely used for flat roof structures and as a plaster base for wall lining. Pumice block, common between the wars, is now rarely seen. Foamed slag, an introduction of the middle thirties has taken its place and is widely used near its source of production. There has as yet been no development of artificial insulating aggregates comparable with the American Haydite, but this may come soon.

The only purely insulating material which I can recall which goes back before 1900 was slag wool. Then, as now, an excellent thermal insulator it was more often used as plugging between joints to reduce sound and fire transmission than as a pure thermal insulator. It was, of course, used to pack pipes and tanks, and in connection with heating installations. Glass silk was a comparative late-comer, not in fact becoming well-known until 1935. Its wide acceptance today if, of course, partly due to its intensive and skilful publicity, but its advantages depend mostly on the ease with which it can be handled. Had slag wool been available in the various sheet forms in its early years its use would have been far greater. Another quilted material in wide use in the last 25 years was eel grass.

To the economist it is an interesting phenomenon that almost the whole insulation market has been created within 25 years, and almost entirely as a result of the sales efforts of manufacturers of materials which were previously unknown or unused. It was the salesman who found, calculated, and showed the need, and proved that insulation would pay dividends to the user as much as the producer. There was no pre-existing demand as there must have been for bricks, or was for methods of acoustic correction in buildings.

Acoustic correction, particularly in the early 1920's, was often merely a minor outlet for thermal insulating materials. Perforated wall boards are, perhaps, a good example, or the use of quilts which were hung with varying degrees of structural complication in the interstices of stud walls. The most notable material developed for and solely used as a sound absorbent, was the porous plaster, either in precast tile or *in situ* forms made under the Sabine formula, first used, I think, about 1926. Another important item is the rubber isolated and loaded floor introduced following B.R.S. research work in the early 1930's.



Above are recent examples of housing sites. That on the left does not easily lend itself to mechanization. That on the right is more simple. But for real economy in mechanization the old continuous terrace was the type of layout best suited to easy excavation of drains and foundations.

THE CARE OF PLANT

This article is based on the observations of an engineer responsible for repairs to building plant—both light and heavy. Experience has shown him that large sums of money are wasted each year—not to mention losses of building productivity—as a result of ignorance, apathy or thoughtlessness on the part of some operatives in charge of light plant.

The assistance which mechanization of building methods might give to an operative in lightening and speeding his work can never be fully appreciated unless his mental approach is changed by education in simple maintenance routines.

That such change is not impossible even for men who are not naturally mechanically minded is shown in the following notes. All that is needed to achieve a vast improvement in the effectiveness of machines as an aid to greater productivity in building, is attention by employers and operatives to a few common-sense precepts of cleanliness and tidiness.

In preparing the article damaged machines of many types were inspected and in the majority of cases the cause of damage could have been eliminated by early attention on the site.

CLEANLINESS, coupled with prompt attention to adjustments, is the golden rule for keeping light plant and other builders' equipment out of the repair shop and on the site.

Dirty plant on a site is an eyesore and when bearing a contractor's name can hardly fail to damage his reputation. That dirt is the precursor of other troubles cannot be over emphasized. Moreover the dirty machine proclaims that it is in the hands of a lazy man and is bound to become a dud one.

Methods of wrecking building machinery are numerous. But most of them can be avoided given the right approach on the part of the operators.

Thoughtlessness, even on the part of conscientious operators, can cause damage. The use of dirty containers for grease and oil, for instance, can and frequently does undo the very good which is intended.

But, thoughtlessness apart, there is still too much actual neglect of plant on building sites throughout the country.

Operators are frequently unaware, because insufficient attention has been given to explaining the working of the machine, that maintenance is as important to keep a mixer or a tractor running as it is to keep a car going. Yet the same operator who bashes a skip would be the last man to use a sledge hammer on his motor bike.

From the employer's angle the inculcation of team spirit and enthusiasm for machinery is perhaps as important as the offering of cash incentives in raising production. For once the habit of maintenance is acquired the habit gives way to interest and even to enthusiasm.

The results are far reaching. Plant properly cared for on one site needs minimum attention on the next, with resultant saving in time, money, and perhaps most important of all, avoidance of frustration on the part of the operator.

For nobody can be expected to show interest in machines which arrive at the beginning of a job in need of repair. On the other hand no trouble is too great for the operator who really appreciates the value of a machine. Witness to this are two stories, both true, of men working for a large firm of constructors. The first story is of the operator who, travelling home on the last train in frosty weather, remembered that he had forgotten to drain his machine. He went back to empty it. The other was of an operator who walked across a building site (not the one on which he was working) one week-end with his family. Noticing a machine uncovered he rendered the necessary first aid.

Only by giving the same care to machines in this machine-age as the animal lover would have given to his horses in days gone by can the full value of machinery be realized.

The teaching of maintenance of light plant to the younger men is important because it is on these machines that men who aspire to operate heavy machines often get their training. Experience seems to show that the older drivers and men who have to operate heavy machinery are better at maintenance than those who use the everyday aids such as pumps, generators, dumpers, etc.

Examples of defects caused by thoughtlessness or lack of knowledge can be found on most building sites. The following instances—a few of many investigated—show how simple measures taken in time can prevent major troubles.

The most common mistake already referred to is that of bashing the drum of a mixer to free hardened concrete.

Generally speaking this arises firstly from failure to wash the machine thoroughly after use secondly from ignorance of the fact that shaker mechanism is provided on the machine and thirdly from inattention to the shaker mechanism even by those who know of its existence.

The results are caked concrete, bashing and dented drums which quickly render the machine unfit to produce accurately gauged concrete and finally means that the mixer has to go out of commission for workshop repair.

Incidentally if abrasive is needed in addition to water for cleaning purposes a little 1½ in. shingle is worth a great many brick bats.

Mixer damage is not confined to drum cleaning. An example recently inspected showed that the gear wheels beneath the drum had been ground down to complete uselessness. The cause was an undetected, or unreported, leak in the drum (caused possibly by brick bats!) which had dripped slurry on to the gears. The visible accumulation of set cement around the gear in the example inspected proclaimed negligence in oiling and greasing inspection over a prolonged period.

Despite the increasing co-operation of the good manufacturers in making machines foolproof, much can still be done by observation on the site.

For instance, a damaged mixer was found to have a cracked gear box. The cause of the damage was not obvious. Tests on a working mixer with an inexperienced operator showed that the tendency of the untrained man was to engage the lever with a sharp tug whereas all that was needed was a gentle "feeling" pull. This particular—and recurring-fault was cured by reversing the lever so that it is push operated. Too great force now results in severely barked knuckles.

While the final responsibility for safeguarding machinery must rest with operators, designers of machines can probably make further improvements by giving attention to such small points.

a corridor in the Clarkson Junior School, Norwich ARCHITECT: LEONARD G. HANNAFORD, F.R.I.B.A.

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SUSE/83

WORKING FOR ARCHITECTS

Sundry Thoughts After Fifty Years' Experience

BY A. FOREMAN

HOW times have changed in some respects but have stood still in others! My first recollection of an architect was in my early apprenticeship when an austere man in a top hat and frock coat visited the joiner's shop in which I worked and stood questioning a very small lad in a large white apron and a paper hat, as we all had, to keep our hair clean. To-day the architect so often seems to be a young person, not always a man, in sports clothes, no hat and a bright tie or scarf. Then, as he does to-day, he attempted to display an attitude of complete superiority over those who are to carry out his wishes but it seems to me he was then more justified in that attitude than he is to-day as his building knowledge was usually superior. I feel sure that in those days the architect's practical knowledge of materials and building methods was very considerable whereas now it seems to be the exception rather than the rule, especially for many of the younger architects, although their theoretical knowledge may be greater to-day; this may perhaps be due to the very much wider range of materials and services of which he is expected to understand. None the less he still tries to convey an impression of superiority which is frequently such a thin veneer that most of those on the job see through it. So many, especially the younger ones I meet in the South whose experience of building must of necessity be small, seem much less willing to admit this insufficiency of real knowledge and frequently fail to take advantage of the experience of the practical members of the building industry. I am, however, equally surprised, in spite of this greatly increased range of materials, at the real knowledge of some of the older architects; they seem to study their materials, and the detailing involved in their application, more carefully with the result that I am sure their buildings will have far less maintenance troubles.

One thing that strikes me above all others is that many of the younger architects seem to be more reckless with their client's money than they were in the past. In my youth architects continually experimented with new materials and methods but always in a limited way until they felt sure that no troubles would arise whereas to-day I see developments tried out on a vast scale which could so easily ruin a reputation should some failure occur.

In the old days architects seemed to be much more interested in the workshop and in the production end of their jobs and we saw them much more often in the shops; this interest resulted in a greater understanding of the processes involved. Admittedly this understanding is now more difficult to obtain as so much is produced in specialized factories but the lack of knowledge of the methods of production is sometimes appalling and leads to foolish designing. I do not think that the average architect really appreciates the extent of these changes in methods of production which economic conditions and scientific progress have brought about. If the building industry, of which the architect should be the leader, is to serve the country properly we must take every possible advantage of these developments, and particularly the machines, which can lower the prices of our building components and fittings. This means the more ready acceptance of mass production and co-operation in the development of well designed mass-produced products. Mass-production means also accepting standardization and the architects should set out to make a real contribution in the preparation of standards and should make better use of those that are available. Neither mass-production nor standardization need, in my opinion, mean a lowering of quality, in fact it should lead to better work especially as the machine can usually do the job better than if it is produced by hand. The costs of specially made goods so frequently required by the architect and so often so unnecessarily different, means "tailor-made" and often "hand-made" goods involving quite disproportionately high costs which the poor unfortunate client has, unknowingly to meet. There are, of course, the jobs where specially designed and specially made articles are fully justified but this should not be applied to work such as housing and industrial buildings. The co-operation of the architects in an endeavour to produce the best possible mass-produced and standardized goods would be a real contribution to building economy. It may be that some of the difficulties with the ready acceptance of mass-production and standardization is due to the fact that to-day the architects have entered into the fields of the provision of buildings for the masses and for pure utility (previously provided by the private enterprise builders) whereas in the past their work was essentially concerned with the better quality jobs for individual clients and they have not yet adjusted themselves to the different outlook needed; this may be the reason why architects tend to hanker after excessive individualism, especially in little things which do not matter at all to the user so long as what they are given is of reasonably good design and works, trouble free, for a reasonable time; the architects should realize that they have also a national duty to provide housing and factories which are not only good to look at but which are economic in first cost and inexpensive to maintain.

Another feature of difference between the architect of early in the century and to-day which surprises me rather frequently is the low quality of workmanship and materials which is passed by him or his clerk of works. Good workmanship is still available if those who supervise insist on having it and pay a fair price. Many has been the time in the past that I have heard "Pull it down" or "Remake it" but seldom are they heard to-day. A little more insistence on quality is needed and a little more careful checking of goods and work to see that they really do comply with the specification. I am sure that the good builders, and especially the good foremen and tradesmen, would be more satisfied if they thought that good workmanship was appreciated and that bad output was unacceptable.

It seems to me that quite a lot of architects to-day are too interested in designing to obtain effects which look fine in photographs taken by the architectural papers as soon as the building is completed but which are apt to look terrible after two or three years' exposure to weather and the normal wear and tear of use; much of this arises from carelessness, bad detailing and the lack of appreciation of the effects of time and use on the selected material. It is a pity that architects, and for that matter builders, do not have to carry the burden of the maintenance of the buildings they design and erect. Much of this maintenance could be and should be avoided by more careful design, better selection of materials and better supervision. More careful design in itself necessitates a good understanding of the materials and methods by which they are assembled. As an example in my own trade, I am surprised how often I see unprotected edges of veneer, presumably from a desire for flush surfaces, which in time, and probably sooner rather than later, will become almost irreparably damaged; good design would, in my mind, take care of these veneer edges by the use of solid timber edgings or mouldings.

I think it is less appreciated to-day than it was years ago that the greatest kindness that can be given to an architect is to have a good contractor; the good firm gives much help and service and does just that little more than the strict interpretation of wording of the contract whereas the less good ones look for all the errors and lack of precision in the drawings and specifications and seek the cheapest possible way to do the job. I do not, of course, mean that the contractor should be expected to put in all the work that was forgotten or not properly detailed or described nor the improvements made during full-sizing. Incidentally a matter seldom discussed in building circles is what happens when architects make mistakes; they are usually put right at the expense of the builder or a sub-contractor or else just lost in the cost of the job quite unknown to the client who merely pays; I have yet to meet the case when the architect pays but of course it may happen.

Still less is it understood by a number of architects to-day, in contrast to the past, how much a good, co-operative and competent foreman may help the job along and, incidentally, the architect himself; this is only effective, however, if the foreman receives real co-operation from the architect also. The foreman's job to-day is much less easy than fifty years ago; labour is more difficult to control, quality of work-

manship tends to be lower unless carefully supervised, building is more complicated, supplies are uncertain, however well planned, and costs are high, resulting in the contractor constantly reminding him of the rising expense and pressing him to hurry, especially some of those contractors who know less about building than the old-time builder.

Another great difference between architects of fifty years ago and to-day is in their drawings; to-day they are certainly more plentiful as photo-printing is so much less troublesome and costly than the tracing of copies by assistants in the office. One drawing matter which has changed little, but if anything for the worse, is the slowness and lateness of the provision of detail drawings; how seldom it is that details are available sufficiently in advance of when they are really required. To-day it is of great importance that drawings are received as early as possible as mechanisation has added so much to the speed of jobs and much more sub-contracting has to be arranged and organized. Architects' working drawings still lack, in many cases, the clearness and precision of those we receive from engineers.

Fifty years ago specifications were by no means precise but then we knew pretty well what was expected and very certainly what was likely to be acceptable. To-day owing to the increase in the variety of materials and processes much greater clarity of specification has become essential; for example, recently a specification called for the distempering of some walls and therefore a true distemper was used; when the work was completed the architect complained that the material used was not washable and what he had intended to be used was an oil-bound water paint; if he had quoted the B.S. number and type reference or if he had specified, quite precisely, the material to be used, this difficulty would not have arisen. Similarly one still sees the occasional specification which asks for large pieces of timber to be "free from all knots, shakes and defects," but trees do not grow like that; nor can a batch of hand-made clay facing bricks be accurate to exactly three given dimensions (as I have recently been asked to produce), so that very narrow joints could be made. This sort of specification is partly the result of lack of knowledge of the materials concerned and partly due to following out-of-date text books but whatever the cause, the result must inevitably lead to confusion, misunderstanding and bad feeling.

It seems to me that the methods used in training some of the architects to-day tend to over-emphasize the teaching of good design, particularly on paper, at the expense of teaching how to build what is designed. This is to some extent a reversal of fifty years ago when architects seemed to know their building construction even if they were not such good designers. What seems to be required is to strike a more happy mean between the two methods. Some change in the training methods is needed as a means of improving quality of work and to encourage better supervision. Would it not be possible for every architect to spend at least twelve months on jobs or in workshops and follow this by at least five years as an assistant before he or she is allowed to build a job on his own account. Office experience alone does not seem to be enough. In the war I worked with resident architects on sites and I am sure they were the better for it. Most of the engineers that one meets in connection with building and civil engineering contracts seem to have worked, at some period in their careers, on the non-professional side or on jobs as a resident engineer with the result that they are more knowledgeable, more competent, more co-operative and more appreciative of the problems that arise on site. Engineers may not be good aesthetic designers but, by and large, they know how to build.

Another point that strikes me about the passing years is that, while many businesses have taken the trouble to present their clients a good impression by furnishing their offices in good taste, only a few architects seem to think this is worthwhile. Equally the selection of offices is often unfortunate; clients do not get a good impression if they have to climb some dirty staircase to the fourth floor and there be shown into an office which is poorly decorated and furnished and, even worse, be left to wait in a half-dark hall-space stacked with old papers thick with dust, as I have frequently had to do. Incidentally I feel that photographs or perspectives of buildings erected long ago and very obviously dated, are apt to create an impression that there is no recent work to show. I am sure it is essential to look prosperous.

Fifty years ago written instructions during the progress of jobs were few and far between but the typewriter has helped a lot in recent years to give us more, and legible, letters; there are still, however, rather too many unconfirmed verbal instructions which lead to unnecessary discussion when the job is being squared up at the end.

One of the differences I notice between 1900 and 1950 is that there seem to be less architects with "personality" and few who are able and willing to accept the role of leader of a team. To-day, more than ever, must there be team-work as the architect, engineer, builder, foreman and operative are, everyday, becoming more inter-dependent. A few of our younger "know-all" friends in the architectural world seem to prefer to attempt to be dictators, instead of team leaders, but you cannot dictate satisfactorily unless those dictated to have confidence in the knowledge and ability of the dictator; these "know-all" types are so often abominably ignorant in any field of which one has personal knowledge with which to judge and it may be assumed that the position is not dissimilar in those fields in which one's own knowledge cannot be a guide. I wonder why it is that some employees of the municipal architectural departments and, to a measure, of official departments are inclined to adopt the "high-horse" attitude in dealing with those on the contracting side; if they would be more choosy in their contractors, perhaps we should not all be classed automatically as ignorant rogues. These people may get more than their fair share of bad work and attempted wangling round the specification; since it is the custom to ask all and sundry to tender, regardless of ability and reputation, what else can be expected; I realize their difficulties and that there are explanations, but they should learn, when they do get them, to treat decent people decently and that greater success comes from co-operation rather than from dictation.

I should like to see more architects working regularly with the same contractors, and asking for particular foremen, as was very general in the old days. In the past there was often an agreed price with a contractor well known to the architect, rather than a competitive tender, or alternatively tenders were invited from a few contractors all of whom were known to the architect for their ability to do a job properly. This method may not have produced the lowest possible price for the job but it gave, in my opinion, better value for the client's money as the contractor had a fair price and in return expected to give a good job but above all this method made for confidence and co-operation.

All that I have tried to say in this note may be summarized as the desire to see revived a better understanding and more co-operation between the architect and the builder, who are just two parts of a rather involved industry whose duty is to provide good buildings at economical prices to satisfy those who own and use them.

SAFETY ON THE SITE

BY SALVO

The writer of this article is Safety Officer to a large firm of contractors of international repute, which designs, erects and equips large-scale industrial plants for public services. During the last five years, he has been responsible for the organisation and operation of the Safety Section of this Company.

The Building Industry is severely limited by regulations and it must always be remembered that compliance with additional rules involves time and money to the contractor. Nevertheless many accidents can be avoided by co-operation and the inculcation of tidy habits. In this article the author explains a method by which building executives who are interested in accident prevention can discuss their problems with a view to increasing safety on the site.

THE "Penguin" cartoons featured in the *Architect and Building News* provide a constant reminder of the need for co-operation by contractors—especially the larger Civil Engineering firms—in the execution of the Building (Safety, Health and Welfare) Regulations, S.I.1948, No. 1145.

These Regulations are an energetic endeavour by the Factory Department to minimise the number of accidents in the Building Industry in recent years, and they are a great advance on anything previously attempted.

Scrutiny of the Regulations provides evidence that if they are to be complied with in an efficient manner, then some sort of consultative organisation for contractors is essential to the well-being of the Building Industry. It may be argued that the help willingly afforded to contractors by H.M. Inspectors of the Factory Department, or membership of the Royal Society for the Prevention of Accidents is all that is necessary, but the real problem of co-operative endeavour will still remain.

The conception of any co-operation is useless unless the executives of a concern, from the highest level downwards, have a real interest in Accident Prevention. It is suggested that any firm, which conforms to this condition, may be interested in and like to take advantage of, the machinery

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A view of Cheapside and Bow Church in the 1840's

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devised by the London Accident Prevention Groups (affiliated to R.O.S.P.A.). During the past few years, these Groups have done and are doing a lot of useful work on Accident Prevention, and their scope could be enlarged considerably by the influx of a number of contractor-member-firms who would give impetus to the proposal for forming a Building Contractors' Group within the framework of the London Accident Prevention Group.

It is an important "function of management" to prevent accidents, which may be vested in a person with a responsible position. It may therefore be of interest to explain the organisation and working of an Accident Prevention Group.

Each Group consists of a meeting of persons nominated to represent the management of firms interested in this problem. It is a self-governing and self-supporting organisation affiliated to R.o.S.P.A., but membership of R.o.S.P.A. is not a condition of membership of the Group.

Each Group has a meeting nominally held monthly, and discussion takes place on the manner in which accidents can be reduced or eliminated. Much information may be gained by hearing the experience of others, and this particular item on the agenda generally provokes useful discussions and is eagerly looked forward to by the members. The meetings are fully minuted and copies are circulated to all member-firms.

In order to join a Group, the member-firm must nominate a representative for whom they will pay an annual subscription. Should they desire to nominate more than one person, an additional nominal subscription per representative would be required.

Application for membership should be made to:

The Director, Industrial Division, The Royal Society for the Prevention of Accidents, 131 Sloane Street, S.W.1.

The application will then be forwarded to the secretary of the appropriate Group both in London and the provinces.

The proposed organisation of the Building Contractors' Group would be on the following lines:

The chairman of each of the following eight sub-committees would become a member of the General Committee of this Group, from which the chairman would be elected.

(a) Legal: for dealing with the interpretation of the Factories Acts and Regulations, Registers, etc., Statistics;
(b) Scaffolding: to include scaffolding, ladders, suspension scaffolds, inspection, etc.;
(c) Lifting appliances: including all types of cranes, derricks, etc.;
(d) Chains, ropes and lifting gear;
(e) Hoists;
(f) Excavations and demolition;
(g) Mechanically propelled vehicles;
(h) Health and welfare.

It would be the duty of each sub-committee to:

(i) Keep the Group informed of any new Regulations or amendments for existing Regulations.
(ii) Examine any member's suggestions or inquiries relative to the sub-committee's work.
(iii) Offer advice generally.

Any delegate could be a member of more than one sub-committee, if he so desired.

The General Committee would:

(1) Provide the agenda for each meeting.
(2) Arrange for lectures.
(3) Arrange visits to works under construction, which would be of general interest to the majority of the members.
(4) Provide a delegate to the London Co-ordinating Committee of the Accident Prevention Groups.
(5) Arrange for monthly discussion of the Building Regulations by one of H.M. Inspectors of the Factory Department.
(6) Discuss any reports from the Sub-Committees.

The proposals outlined above would not cut across the work done by existing Contractors' Associations or Trade Union obligations.

In order to meet the requirements of Regulation 98 of the Building Regulations, a person must be appointed in writing to carry out the duties of Safety Officer. The appointment of a Safety Officer is an important obligation on a firm employing more than 50 men all told, and it is suggested that the most suitable person for the position would be one aged 40 to 50 years, who has been in charge of construction for some time, and would therefore be acquainted with the requirements of the various Regulations. A young man would probably be more acquainted with the legal side of the appointment but would not be so advanced in the experience of construction.

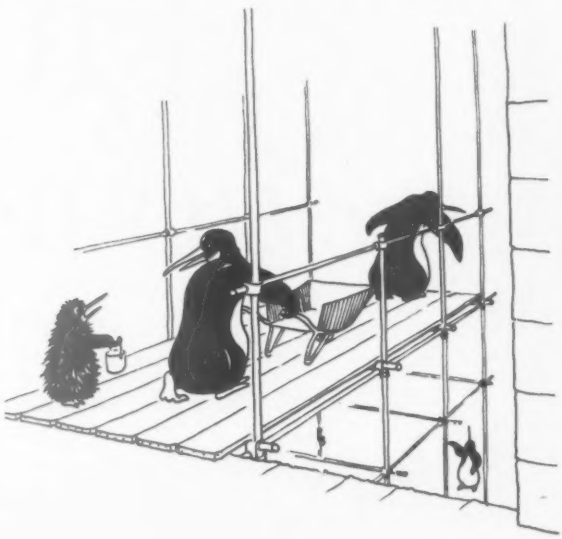
The larger firms, with outlying contracts, would appoint the Safety Officer to Head Office for advising the management and organising the Safety Section generally. The representative in charge of a contract would superintend the requirements of the Building Regulations, and would be termed the Safety Inspector on the work being carried out. Any recommendations from the Safety Officer would be forwarded to the site by the head of the Construction Department.

It is also suggested that the status of the Safety Officer should be not less than equal with that of the contractors' senior outside representative-in-charge of construction; and he should be responsible to an official at the highest level compatible with the position, for the organisation and operation of the Safety Section.

It is hoped that this article may be of sufficient interest to all contractors to encourage the formation and development of a Building Contractors' Group on the lines suggested.

To show that these cartoons are not purely hypothetical cases, the photograph above is reproduced as a reminder that the regulations are ignored even on important jobs. Methods of achieving greater co-operation are outlined in the article above.

ACCIDENTS ≠ BUILDING



DOMESTIC SOLID FUEL APPLIANCES, 1900 - 1950

By John Pinckheard, A.R.I.B.A.

THE development of domestic solid fuel appliances moved slowly for most of the past fifty years and only in the recent post-war period have there been really noteworthy changes. The reason for the relative stagnation in appliance design is attributable partly to the abundance of cheap fuel which existed, at any rate up to the outbreak of World War I, and partly to our relatively mild climate, unlike that of the continent where the more severe winters made efficient heating a necessity. These factors for long undermined the possibility of any popular acceptance of more efficient appliances. For it should not be thought that the necessary scientific and technical knowledge for designing better appliances did not exist. Basic principles of fireplaces design had long since been enunciated by Rumford and later by Arnott, Edwards and Teale. Many of the features characteristic of to-day's appliances had made their appearance in one form or another by the beginning of the century. The slow combustion stove with its accurate air control was already known in Britain, Captain Galton had designed his convector fire, and closeable open fires had been installed in the Houses of Parliament, but none of these innovations gained wide acceptance. With best house coal at under £1 a ton the running costs of fires and ranges were no doubt not serious enough to induce the consumer to entertain these novel appliances with their higher capital costs. Perhaps, too, such appliances or their installation were not always entirely satisfactory; there were complaints, for example, that early convector fires "burned the air." However, the basic fact remains that so long as fuel was cheap enough for it to be used prodigally few people were disposed to bother with such innovations. Nor did ideas of labour saving begin to receive much consideration till after World War I. In the pre-war world of cheap domestic labour when every middle-class family aspired to employ a resident maid, there was little enough incentive to alleviate the daily routine of fire lighting and blackleading. It was the servantless household that heralded gas ignition and vitreous enamel.

At the beginning of the century the coal-fired kitchen range for cooking and domestic hot water and the open fire for space heating were practically universal. Gas cookers and fires, both of which were known to the Victorians—cookers had been exhibited at the 1851 Exhibition—did not secure widespread adoption till the end of the first decade of the new century. The use of gas, and later also electricity, for cooking had, however, important repercussions both on the development of solid fuel appliances and on house plans.

Coal production had reached its peak in 1913, a year which also marked the end of the era of cheap coal; after World War I fuel was dearer and scarcer. In the inter-war years gas for cooking made rapid strides and later, especially in the '30's, electricity too became a serious competitor. By 1938 two houses out of three had gas cookers and about one in ten had electric cookers. The number of the latter was growing rapidly and in the six years prior to the war the total number installed was trebled. The kitchen range which had formerly provided cooking, hot water and space heating was thus to a large extent superseded. Its water heating and space heating functions were taken over either by the open fire with back boiler, or more frequently by the independent boiler which found a place especially in the south of England in hundreds of thousands of speculatively built houses in the '30's. With the disappearance of the range the functions of cooking and heating which in working-class houses had formerly occupied the kitchen-living room became separated. A new pattern emerged—exemplified clearly by the typical speculative builders' "universal" plan—in which cooking was performed in the kitchen, equipped with a gas or electric cooker, and eating and recreational activities were conducted in one or more other rooms, heated by an open fire or fires. Eating in the kitchen did not, however, lose its traditional popularity, a factor which has been recognised in many post-war plans by the adoption of a dining-kitchen.

The developments since 1945 are well known. The urgent need to use fuel economically and at the same time raise the standard of house heating provided a powerful stimulus to the production of more efficient solid fuel appliances. Emphasis has been laid particularly on the multi-duty appliance capable of providing space heating, water heating and sometimes cooking. The centrally-placed stack with a single appliance giving heat to more than one room has become a characteristic feature of post-war plans. This arrangement relates especially to the living-room and kitchen-dining-room plan where two rooms require heating. The developments in three separate fields—cookers, open fires and stoves—are discussed in more detail below. Attention is given mainly to the types of appliance which were being produced at a given period rather than those which were in most common use. In other words, an attempt is made to select the appliances most representative of the technical level of their period. The modern solid fuel grate, for example, with its accurate air control and additional firebrick insulation is taken as representative of to-day even though it is many times outnumbered by the inefficient stool-bottom grates still doing service in some twelve million homes.

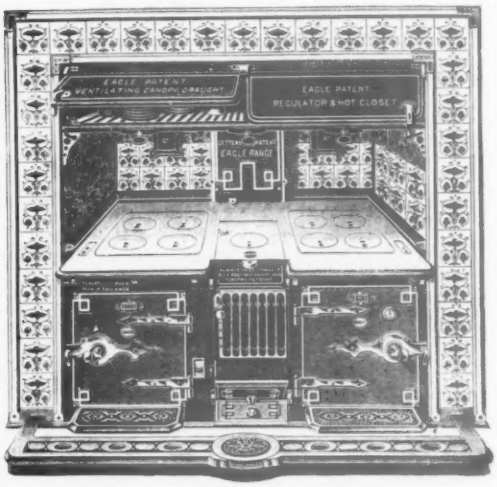


Fig. 1. A typical closed top range of the kind installed in 1900 in medium sized houses.

Courtesy of Eagle Range & Foundry Co.

Cookers

New ranges installed after 1900 were of the closed-top type though in many houses in the North old open-fire Yorkshire ranges continued in use for many years and some exist to this day. The closed top range represented some advance in efficiency over the open fire range—in particular, oven heating was achieved by little more than half the fuel formerly consumed on the open range. The open range had no means of regulating the entry of air to the fire bed and combustion could be only crudely controlled by the flue and oven dampers. The early closed-top range had an additional means of air control by means of the ashpit cover. The fact that the fire was more enclosed, however, tended to induce fierce combustion and judicious use of dampers was necessary to keep the fire under control.

A typical closed range as installed about 1900 is shown in Fig. 1. Another contemporary model is shown in Fig. 2. The

Fig. 2. A typical range of the type installed in 1900 in smaller houses. This model has an openable top to give a view of the fire.

Courtesy of Eagle Range & Foundry Co.

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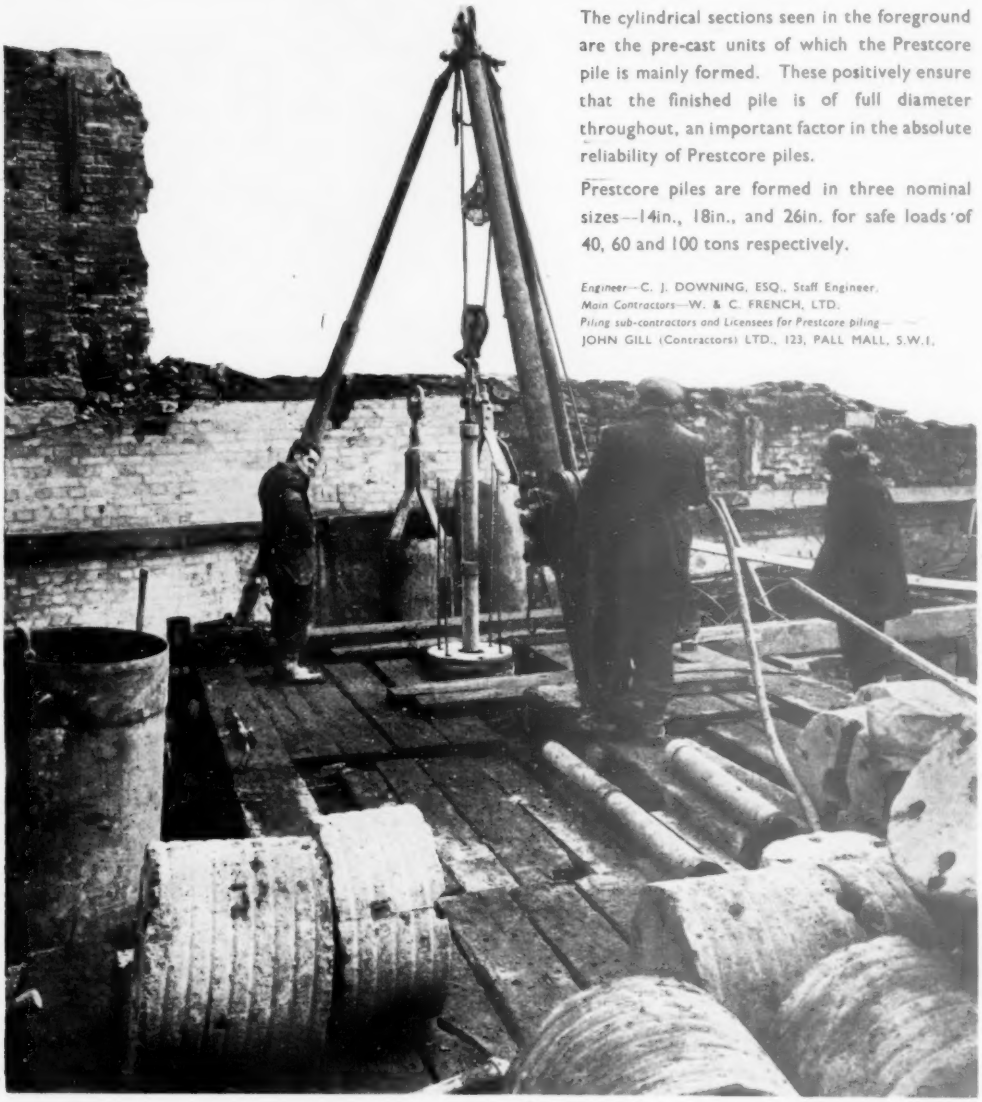

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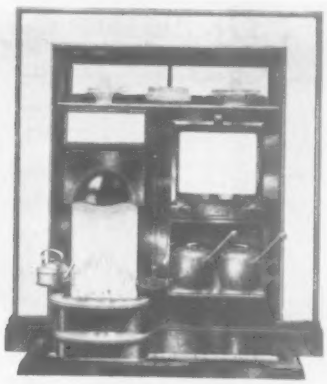

Fig. 3. A side oven combination grate of the type introduced in the '20s.
Courtesy of Eagle Range & Foundry Co. Ltd.

Fig. 6. A typical range of the inter-war years. Vitreous enamel has replaced black lead. Courtesy of Smith & Wellstood Ltd.

range was often designed to be openable to give a view of the fire—a popular arrangement when the appliance was installed in a living-kitchen. There was always a boiler—either a high pressure boiler, with flow and return pipes to a storage cylinder, or a tank boiler which was filled by hand, the hot water being drawn off by a tap on the front of the range, as in Fig. 2.

After World War I a number of changes were made both to raise efficiency and improve appearance. There were two main lines of development—first improvements in the old pre-war closed-top range, and second the introduction of combination grates. Combination grates were developed largely for houses with kitchen-living-rooms such as were then being built by the local authorities, and the object was to produce a reasonably attractive appliance in which the oven and boiler were associated with what appeared to be a living-room fire. Combination grates were of three types—side-oven, oven-over-fire, and back-to-back. In some models, called "convertible grates," a hot plate concealed the fire but could be hinged up when not required for cooking. A typical combination grate of the period—a side oven model—is shown in Fig. 3. Oven-over-fire and back-to-back models are illustrated respectively in Figs. 4 and 5. The combination grate was in fact developed round an open fire. A similar appliance, but more efficient as a water heater, was also developed with an independent boiler as its nucleus. In this case the fire was almost completely enclosed by the waterways of the boiler but doors could be opened in the front to give a view of the fire. At the same time, improvements were being made in cookers, in particular better air control, vitreous enamel finishes and, later, thermal insulation. One such cooker is illustrated in Fig. 6.

Up to about the end of the '20's not much attention had been paid to thermal insulation. In 1929, however, the heat storage cooker was introduced from Sweden and soon two firms in Britain were producing cookers of this type. The heat storage cooker, heavily insulated and provided with thermostatic control, was, and is, too expensive in first cost for ordinary housing, though because of its high efficiency running costs are very low. Partly due, no doubt, to the example of heat storage cookers, insulation began in the '30's to be applied to the less expensive appliances, first to oven doors and sides but later more comprehensively.

Since the war manufacturers of solid fuel cookers have made determined attempts to meet the challenge of gas and electricity and as a result present-day cookers are greatly superior to pre-war models both in performance and appearance. The distinguishing features of the present-day cooker, which now embodies features formerly only found in the more expensive heat storage cooker, are more refined air control, a totally enclosed continuous burning fire and better thermal insulation including an insulated hot plate cover. In many models, oven flues, which formerly needed weekly cleaning, have been eliminated and ovens are heated by convection. In addition to cooking, the cooker supplies domestic hot water and some space heating and some of the best designed models are excellent in appearance. The solid fuel cooker fits well into the "living-room plus kitchen-dining-room" plan where its space heating capacity is used to advantage. A typical present-day cooker is shown in Fig. 7, and a combination grate in Fig. 8.

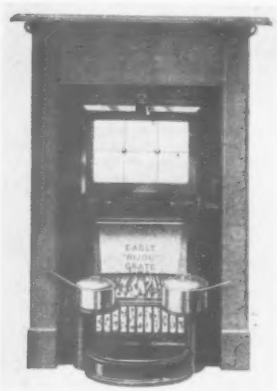

Fig. 4. Above: An oven-over-fire combination grate of the same period as Fig. 3.
Figs. 4 & 5 courtesy of Eagle Range & Foundry Co. Ltd.

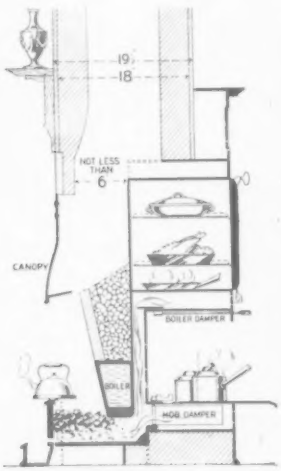

Fig. 5. Above: A section of a back to back grate of the type introduced after the first World War.

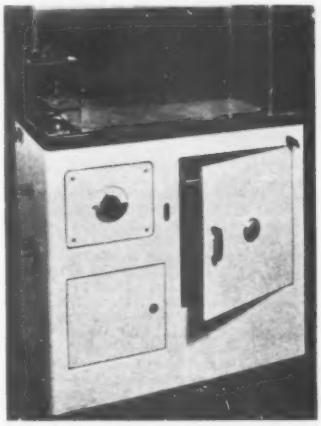

Fig. 7. A present day free standing cooker.
Photo by courtesy of the Women's Advisory Council on Solid Fuel.

Fig. 8. A present-day side-oven combination grate.
Photo by courtesy of the Women's Advisory Council on Solid Fuel.

Fig. 10. A "tile register grate" of about 1900.
Courtesy of Messrs. Smith & Wellstood Ltd.

Fig. 11. A "mantel register grate" of the same period.

Open Fires

In 1900 solid fuel grates were the universal means of space heating and even to-day they remain the principal means though supplemented by other fuels. The most significant improvements have taken place during the last five years though the principles underlying many of the features which characterize post-war grates were well known before the beginning of the century.

A very large proportion of open fires were of the characteristic Victorian pattern with a vertical back, wide throated flue and with no ashpit cover or other means of regulating, even crudely, the supply of combustion air to the fire bed—a combination of features admirably suited to ensure extravagant fuel consumption and a minimum of heat delivered into the room. A fire of this type is illustrated in Fig. 9.

Fig. 9. A typical Victorian fireplace lacking any means of air control. Fires of this kind continued to be installed well into the present century.
Courtesy of the Planet Foundry Co. Ltd.

The importance of better air control had long been recognized and new fires installed in the early 1900's were more often of the "tile register" pattern or "tile mantel register" of the types illustrated in Figs. 10 and 11. The back and sides were of firebrick though the firebrick back did not usually continue up to the throat of the flue; the back sloped forward slightly. An ash pit cover enabled some control to be exercised over the rate of combustion. There was a projecting hood usually hinged and often a hinged register plate in the flue so that it could be sealed in the summer and soot prevented from falling into the grate. The sides of the surround were tiled and splayed on plan so as to offer the minimum obstruction to the emission of radiant heat from the fire. Fire bars were thin, again so as to have the minimum screening effect on the radiant heat source. The vertical fire bars are characteristic of early 20th century grates.

At the same time fires which were much more akin to our own were being installed and which indeed were the immediate forerunners of the "improved" smokeless fuel grate" of post-war years. These new fires had been developed mainly as a result of the work of Dr. Pridgin Teale who in 1889, in his book "Economy of Coal in House Fires", had enunciated the principles governing the design of open fires. Teale's principles which were very largely a return to the basic ideas formulated nearly a century earlier by Rumford had a considerable effect on open fire design and by 1900 several firms were making fires embodying his recommendations. Briefly, Teale advocated the maximum use of firebrick, which is an insulator (and, therefore, maintains the firebed temperature), and the minimum use of iron which is a conductor (and, therefore, drains heat away from the firebed). The firebrick back should slope forward over the fire so as to obstruct direct radiation up the chimney and instead, by itself becoming heated, radiating heat into the room. The heated fireback would also assist in the combustion of the hot gases passing in front of it. The firebed should be deep from back to front partly to allow space for the back to slope forward and partly to protect the fire from the stream of cool air entering the flue mouth. The grate bar spacing should be narrow to prevent undue ashpit losses due to unburnt fuel falling through and front bars should be of small size to minimise screening effect. Finally there should be a shield to enclose the ashpit and so prevent free access of air to the firebed.

Open fires embodying these features were being installed at the beginning of the century and steadily increased in popularity. There were a number of variants, some had a sunk fire box in which the fire burned directly on the firebrick hearth, in some the ashpit was sunk and covered by grate bars, air for combustion being introduced through ducts under the hearth. Front fire bars were reduced to a minimum to allow unobstructed radiation and in the sunk fire models the front fire bars were omitted altogether. In 1902 Lionel Bratt introduced the first stool bottom grate without front bars. These fires were all more efficient, and, therefore, produced less smoke, than previous types and their adoption was stimulated by the widespread interest which existed around the question of smoke abatement. London fogs were then notorious and as part of the campaign against atmospheric pollution tests on "smoke-consuming" grates were organized between 1901 and 1905 under the auspices of the Coal Smoke Abatement Society. One of the three fires which emerged most successfully from the tests is illustrated in Fig. 12. A sectional view of another fire of rather later date but also embodying Teale's ideas is shown in Fig. 13.

Although they were never widely adopted mention should be made of some of the early fires designed for convection heating if only because they are the prototypes of the present-day convector fires. The best known of these was the Galton fire intended mainly for public buildings and larger houses. This was on the market well before 1900 and was sold under the description of a "ventilating grate" till as late as 1920. An illustration is to be found in Mitchell's "Building Construction," 1902 edition; a section is shown in Fig. 14.

Doors for enclosing the fire also featured in early 20th century grates. One fire so equipped is shown in Fig. 16. The doors were intended to provide better combustion control and to promote overnight burning. It is interesting that this idea which so clearly foreshadows the modern closable open fire should have been lost sight of for so long. Abundant cheap fuel was probably partly the cause and no doubt overnight burning did not offer efficient attraction in the days before 1914 when there was abundant domestic labour to deal with daily fire lighting.

In the inter-war years open fire design did not proceed much beyond the point to which Teale had brought it. Back boilers which had been used on a limited scale for many years, were introduced on a very much wider scale—a development related to the partial supersession of the solid fuel range by gas and electric cookers. Open fires were adapted to burn coke mainly by increasing the fire box capacity and by incorporating gas ignition.

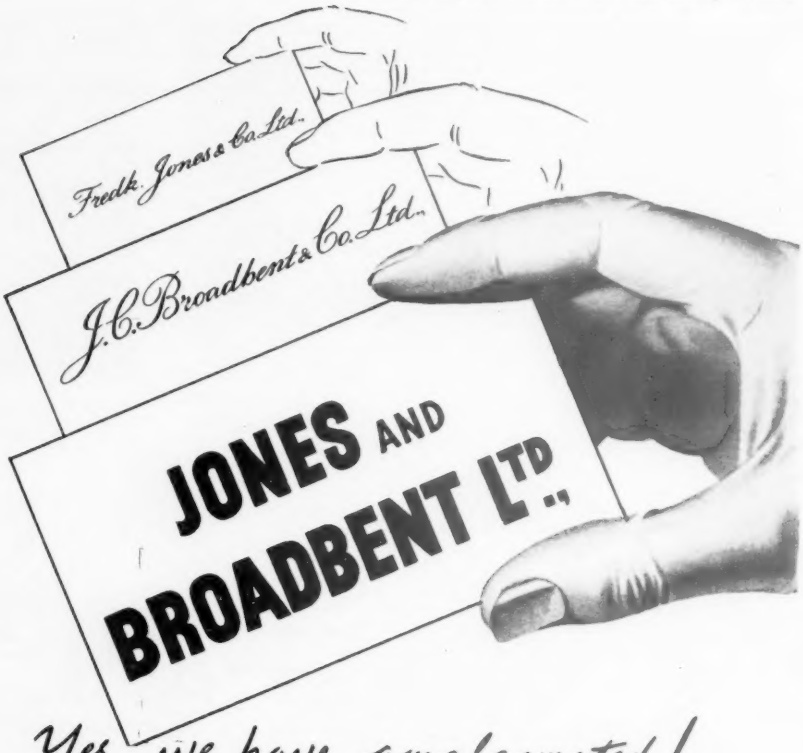

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Fig. 12. An early "smoke-consuming" grate—the "Florence" fire, made by the London Warming and Ventilating Co.—one of the three models which emerged successfully from the tests conducted in 1905 by the Coal Smoke Abatement Society.

Fig. 14. An early convector fire: The "ventilating grate" designed by Captain Galton.

Courtesy of Messrs. Bratt Colbran Ltd.

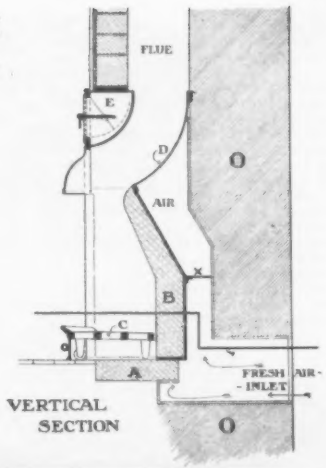


Fig. 15. A grate of about 1900 fitted with regulating doors for controlling the rate of combustion. Three pairs of doors were provided enabling the fire to be wholly or partly enclosed and which folded back against the splayed tiled sides when not in use. In the illustration the three right hand doors are closed over the fire. Courtesy of the Eagle Range & Foundry Co.

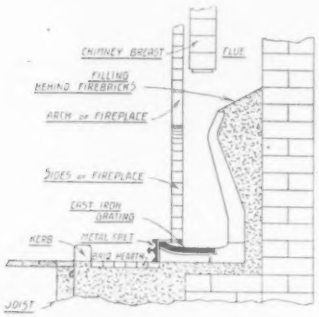


Fig. 13. An open fire which embodies many of the principles advocated by Teale, in particular, the forward-sloping back, fire-brick insulation and minimum obstruction to radiation.

Courtesy of Messrs. Candy & Co. Ltd.

Since the war the developments are well known and largely due to official intervention the new developments have passed into current building practice more quickly than at any previous time. Briefly, the new features are: the very much more accurate devices for air control, the application of the convection heating principle to small domestic fires, the deep firebox with firebrick insulation at the front designed to burn a wide range of fuel including both bituminous coal and coke, and the provision of a movable hood to enclose the fire and promote overnight burning. Another improvement related more to convenience than to thermal efficiency is the deep ashpit with capacity for a week's supply of ash. A typical modern open fire is shown in Fig. 16.

There is no space in this article to follow the architectural changes which have occurred over the past fifty years in the design of fireplace surrounds. The surround, because it is inevitably a focal point in the room and because its design is not much inhibited by practical requirements, has always been a peculiarly sensitive barometer of architectural—and perhaps more important—of popular taste. The fireplace manufacturer who when asked his views on the stylistic changes of his products said "In 1900 they were tall and narrow, after 1920 they began to get low and wide" was certainly right but the broad generalization conceals ample material for an entertaining study in the recent history of popular taste.

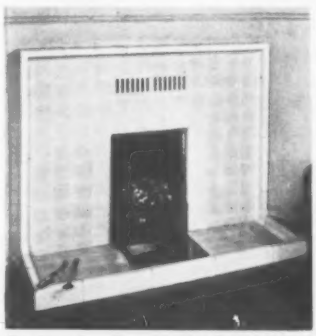


Fig. 16. A modern convector fire with deep ashpit. There is an under floor air supply and warmed air is discharged through the grille in the surround.

Fig. 17. One of the earliest anthracite stoves introduced in 1880—and forerunner of the modern openable stove which continued to be installed at least until the introduction of the closed slow combustion stove in 1903.

Courtesy of Messrs. Smith & Wellstood Ltd.

Stoves

Stoves have never gained the popularity in Britain that they enjoy on the Continent. They were first manufactured here in 1870. The model illustrated in Fig. 17 was introduced in 1880 and continued to be installed on a relatively limited scale after 1900. It was designed to burn anthracite which was then fairly plentiful and had the advantage of being smokeless. The fire could be closed in by means of two sets of sliding doors—one above the fire and one below—but was not claimed to be all-night burning.

The closed slow combustion stove modelled on a French prototype was introduced in Britain in 1903. A stove of this type is illustrated in Fig. 18. It incorporates practically all the features associated with the present day closed stove, in particular, accurate air control and tightly fitting front doors and fuel doors. It was capable of burning for from 12 to 24 hours without refuelling. Such stoves were and are highly efficient in comparison with other solid fuel space-heating appliances but they made slow headway against the entrenched popular preference for open fires.

In 1924 the openable stove was introduced from Denmark and soon firms in this country were producing stoves of this type. Since the war official encouragement has been given to the wider use of stoves, because of their greater efficiency, and they have been installed in a number of local authority houses and as replacements for old open fires in existing buildings. Because of the scarcity of anthracite, the present day openable stove, such as that illustrated on page 23, A. & B.N. of January 5, 1951, is designed to burn bituminous coal or coke.

Back boilers were incorporated in some of the first openable stoves and now all types of stoves, both closed and openable, can be supplied so equipped.

The foregoing notes touch on some of the developments of the last half century and many gaps are left unfilled. Sufficient has been said to indicate that with the stimulus of necessity rapid technical improvements have occurred after a long period of relative quiesence. If it is not too optimistic to assume the continuance of research and development even on the same scale as during the past five years, we may hope for some notable advances in the next decades.

Fig. 18. One of the first closed slow combustion stoves, designed to burn anthracite. Introduced in 1903 it embodied most of the features which to-day contribute to the high efficiency of this type of appliance.

Courtesy of Messrs. Smith & Wellstood Ltd.

ELECTRICITY—50 years of development

By P. Honey

HAD Michael Faraday been alive in 1900 he would have been disappointed with the development of his epoch-making discovery in 1831 of electro-magnetic induction. For in 1900 probably not more than one building in a thousand had the benefits of electricity. Neither private nor municipal enterprise had yet asked for statutory powers to undertake to provide electricity for those districts.

The slow progress of electricity was however, probably due as much to faulty legislation, and to the fact that its rival was then firmly entrenched as to public resistance.

Not until the World War I did the country realise that electric light and power were essentials to armament production. Home-coming ex-service men then wanted it in their homes, and factory workers demanded the newer power in their workshops. Since 1914 tremendous expansion has taken place.

Parochial generation of electricity was the rule until the Grid was started in 1926 to link England's and Scotland's generating facilities into a single entity—but with distribution still in the same hands as before.

About the same time the British Broadcasting Corporation was growing. And as the cat's whisker gave place to the valve some alternative to the accumulator and high tension battery became necessary. Public electricity could supply this alternative. "All-mains" radio, as it was called in 1930, was undoubtedly one of the principal causes for the demise of gas lighting—as the electricity authorities were quick to realise. Installations were supplied on a rental basis (a leaf out of the gas industry's book), which brought hundreds of thousands of rented houses on to the electric supply industry's books.

The nineteen-twenties saw the general introduction of electrical two-part tariffs where one low rate per unit covers every use provided a fixed periodical lump sum is paid as well. So successful was this tariff that it made the more general use of electricity for other purposes desirable. Hire and hire purchase schemes were also introduced for electricity supplies.

Until 1930 houses were fitted with wiring for electric light only. A plug point might be installed in the kitchen for an iron and one for the radio if it was one of the new "all-mains" type. Few people had plug points for electric fires. And even the few plugs had different gauges and types in every house. To move house generally meant expense in changing either plugs or sockets. Only lamp-holders were standardised.

Now the centre of electrical gravity in

the house has shifted until the important part of its wiring is no longer the lighting system but the plug points. In the following notes the principal developments in wiring methods, lighting and heating over the past 50 years are briefly described.

Electrical Installation Progress

Fifty years ago electric wiring was largely on the "tree" system following water and gas practice and consisted of rubber insulated cables concealed in wooden casing fastened to wall surfaces and painted to match existing decorations. A rising main had branches of smaller gauge wire taken from it to each floor with further branches to each room. Where a branch was "tee'd" off from the larger cable a fuse was inserted, often in remote and inaccessible spots. Sometimes the fuses were thoughtfully placed alongside the wall switches with which they were associated. Apart from the difficulty of locating a blown fuse this system was no doubt responsible for the number of electrically-caused fires as there was no indication to show what size of fuse wire was requisite in each case. If the user replaced his own fuses (as was often the case) he probably used the same size fuse wire for the branch circuits as was used in the fuses in the main wiring. When the cable subsequently overheated inside the wood casing conditions were favourable for a healthy conflagration!

The first ten years of the new century saw the general introduction of the "distributive" system of electrical wiring with fuses grouped usually at the intake. The "tree" system was abandoned. Metal conduit was also finding favour but for some years it was not fully realised that the system of tubing had to be electrically continuous. Screwing the tubes together achieved this requirement but was relatively expensive compared with wood casing which it was to succeed. In an attempt to overcome this difficulty conduit was produced in a cheaper form the notorious "closed joint" type which was simply a circular tube with an open seam running throughout its length and joined by elbows, tees and sockets which had no screw thread or method of securing each fitting. When installed this conduit gave a certain measure of protection from mechanical damage and was largely fireproof, but the tubing which was merely pushed into the open end of its connecting sockets, elbows, etc., could not be adequately "earthed" as it was not electrically continuous. In case of damage to the cable no leaking current could flow direct to earth but probably found means of escape through neighbouring gas pipes with disastrous results. To remedy this defect without going to the length of screwing tubes and fittings together, conduit accessories were provided with grub screws which gripped the tubing so that electrical continuity could be achieved. Using seamless tubing the "continuity grip" system is still widely used to-day and is next best to the completely waterproof and hundred-per-cent. safe system of screwed tubing which is now largely specified and used all over the country.

One further wiring development remains to be recorded, the introduction of the Domestic Ring Main system of wiring to plug points which is a post-war innovation. In most small houses the plug points provided may either be an offshoot of the lighting circuit, limited to the connection of 1 kilowatt appliances or even less, or else a separate "power" circuit. The latter has grown from a nominal 10 ampere circuit to the now more general 15 ampere circuit, the latter taking appliances consuming up to 3 kilowatts at each point.

Varying sizes of plug points have always been a disadvantage in the wider utilisation of electricity. The Ring Main was designed to overcome this difficulty as all the plug points connected to it were to be of one uniform size. The Ring Main differs from the ordinary "distributive" system of wiring to plug points which radiate from one central point. Instead, the wiring takes the form of a continuous ring or loop of conductors which starts and ends at the meter position where it is suitably controlled and protected by a large 30 ampere fuse. All the plug points are connected directly to this Ring Main and the individual fuses for each plug point, instead of being all grouped at the meter end, are contained instead inside the plug top of the appliance connected to it. The Ring Main enables far more plug points to be provided in a house with considerably less cable. But it has its limitations. The plug points have to be of a certain type which are non-interchangeable with ordinary 5 and 15 ampere types.

Although standardised by B.S.I. specifications over many years plugs and socket outlets are still confusing in their number. There are in fact seven standardised types still in use.

In 1900 the wall switch was a massive brass affair with an "unearthed" metal cover. Later on it was decided that electrical contacts lasted longer if they are made to meet or part at high speed. The switch of 1930 had a very noisy action with its quick make-and-break mechanism which introduced an inch gap between the contacts. This was necessary for direct current which always arcs badly when contacts open. With alternating current the contacts need only separate by a fraction of an inch and as A.C. is actually at zero pressure at the end of every alternation the contacts need not separate quickly. Modern switches are of the slow-make small-gap type and are practically noiseless in action.

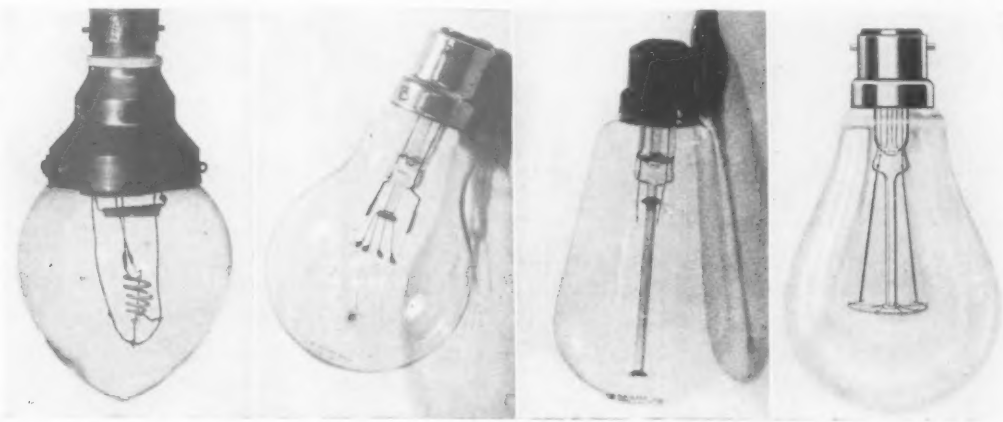
Electric Lighting

The carbon lamp was the indoor form of electric light in 1900. Out of doors the flickering electric arc brilliantly lit up main roads in progressive cities and boroughs. Londoners may be surprised to know that some of its main streets and thoroughfares which to-day are lit by gas, relied as long ago as 1900, on the electric arc lamp.

The carbon lamp was, however, very inefficient. A sixteen candle power bulb used one unit in twelve to sixteen hours. In comparison a modern filament lamp of this candle power runs for sixty-six hours for one unit.

There was fierce competition between gas and electricity. The flat flame gas burner could not match the carbon filament but Welsbach's upright mantle did. Then came the metal filament, fragile first but stronger when it was eventually made of drawn wire. The inverted gas mantle followed and held the field for many years until the gas filled lamp came to rival it. Fluorescent lighting is the latest development. From carbon lamps to fluorescent the efficiency of light production has multiplied ten times.

The standard of lighting as well as efficiency has been considerably raised during the last 50 years. In 1900 about 25 candle power was considered adequate for domestic use from a gas fitting. There may have been an additional burner but it was only brought into action on special occasions. Besides, two burners could sometimes make



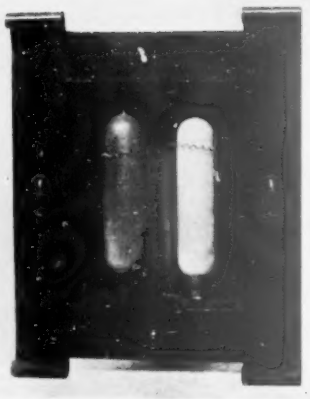
From left to right a carbon filament lamp as used in 1900, a drawn wire tungsten filament lamp as used in 1910, the Nerast electric lamp also circa 1910, and a modern gas filled electric lamp.

a small room quite stuffy. In the 1920's one 60 watt lamp was considered sufficient for a 16 ft. by 14 ft. room. To-day even the smallest council house has a 100 watt lamp in its central fitting. Modern requirements are from 300 to 400 watts in living rooms, provided perhaps by a 180-200 watt central fitting and two supplementary table or floor standards. The two-part tariff with current available at 1d. per unit or less has made the extra cost of this better standard of lighting practically negligible.

Seeing that the main lamps in grandfather's room, if he had the luxury of electric lighting, were probably of 16 or 25 candle power each electric light fitting was often of the rise-and-fall type. This was necessary to bring a greater intensity of light to bear upon close work at the table. Rise-and-fall pendants, particularly in the dining-room and over the office desk, went out with the 1920's. With higher intensities of light production the open shade also became less popular and semi-indirect lighting or the totally enclosed fitting took its place. The trend was towards shadowless lighting now more completely possible with the tubular fluorescent lamp, a development of the "gas-discharge" principle of illumination, and a new technique in fittings design appeared. Suspended fluorescent fittings brought with them problems of weight distribution and the housing of starting gear, chokes or transformers. Yet this form of tubular lighting is not as new as we moderns would think as it was first introduced well before World War I as a nitrogen-filled high voltage tube. A little later mercury vapour was used as the light producing medium operating at mains voltage.

Electric Heating Equipment

Although electric light was considered to be relatively "cool" compared with oil or gas lamps the carbon filament lamp gave out considerable radiant heat—a pleasant heat when sufficient lamps could be grouped in a reflector. From this grew the first "sausage" tubular lamp radiator each



A lamp radiator of 1905

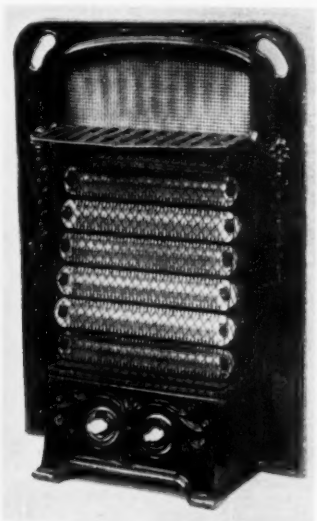
lamp with its carbon filament glowing in a frosted vacuum-filled tube consuming from 200-250 watts. It was only capable of providing local heat as it needed eight lamps at least to warm up a room of 1,500-2,000 cubic feet. It was bound to be superseded by red-hot wires glowing in free air, although an improved type of radiator with metal filament lamps and more intense radiation had a certain amount of popularity in pre-war days.

The development of the electric fire with its fireclay slab heating element and the more recent reflector type of fire has been rather a problem of metallurgy rather than design. Early electric resistor wires could only be run at a dull red heat or they quickly burnt out. The perfection of processes of alloying nickel and chromium brought possibilities of closer coiling and brighter radiation. The electric fire of to-day is a far more cheerful companion than its 1910 type though its consumption is no greater. The electric air warmer of Edward VII's time is, however, not much different from some electric convectors of to-day but modern designs show evidence of considerable research into air circulation especially when assisted by an electrically-driven fan. Liquid-filled radiators of 1910 used water as the heating medium where to-day oil is used. Panel heating is, however, a development of the 1930's except that the introduction of plastic has enabled the resistor wires to be embedded direct in the panel itself which can be finished with a plastic veneer simulating expensive timbers.

Electric water heating dates back to pre-1910 when immersion heaters were made to screw into hot water tanks. Progress had to await cheap electricity and it was not until 1930 that electrically-heated and highly insulated thermal storage cylinders thermostatically controlled were made in considerable numbers in Britain.

The robust cement-filled tubular electric immersion heater represents the most popular type of these modern water heating devices especially when used in conjunction with solid fuel. In forty years the immerston heater has quietly progressed and is now, according to a recent survey, considered most satisfactory by 86 per cent. of users who were questioned.

Electric cooking was slow in gaining any kind of popularity until 1930. It too, needed cheaper electricity to encourage its use, and, no doubt some kind of scheme for hire or hire-purchase to put it on level terms with its competitor, the gas cooker. Although slow in operation, limited in heat control, and not quite so robust as one would wish in those days, the cleanliness and excellent results of cooking by electricity gained many adherents. To-day the modern electric cooker shows considerable evidence of progress in which speed of operation is combined with infinitely variable and thermostatic control of its parts, whilst reliability has improved enormously.



An electric radiator of 1910

One of the earliest electric cookers (about 1913) compared with a modern model by the same firm

CONTRACT • NEWS •

*Notes below give basic data of contracts open under locality and authority which are in bold type. References indicate: (a) type of work, (b) address for application. Where no town is stated in the address it is the same as the locality given in the heading. (c) deposit, (d) last date for application, (e) last date and time for submission of tenders. Full details of contracts marked * are given in the advertisement section.*

OPEN

BUILDING

BRAINTREE AND BOCKING U.C. (a) 10 aged persons' bungalows, Fennes Road Estate, Bocking. (b) H. Cook, Town Hall, Braintree. (c) 2 Gns. (e) Jan. 27.

* * *

BRIGHTON B.C. (a) Bathing Station, West Pier. (b) Borough Engineer, 26-30 King's Road. (c) 2 Gns. (e) Jan. 30.

* * *

BURNHAM-ON-CROUCH U.C. (a) Public hall. (b) Stanley Bragg, 16 London Road, Chelmsford. (c) 3 Gns. (e) Feb. 9.

* * *

ETON R.C. (a) Additions to Council Offices. (b) David Hartley, 14 Mackenzie Street, Slough. (d) Jan. 26.

* * *

GATESHEAD B.C. (a) Erection of (1) Residential special school, Hindley Hall, Stocksfield. (2) Classroom block at new Technical College, Gateshead. (3) Two junior schools at Southend Road, Sheriff Hill, Gateshead. (b) Chief Architect, Municipal Offices, Swinburne Street. (c) 5 Gns. each contract. (d) Jan. 25. (e) (1) Feb. 14. (2) Mar. 5. (3) Mar. 5.

* * *

LIVERPOOL C.C. (a) Primary school, Speke. (b) City Architect, Blackburn Chambers, Dale Street, Kingsway, Liverpool, 2. (c) 2 Gns. (e) Jan. 22.

* * *

LONDON, BARNES B.C. (a) 14 houses and flats, Kingsway, Lower Richmond Road, Mortlake, S.W.14. (b) Borough Engineer, Municipal Offices, Sheen Lane, S.W.14. (e) Feb. 14.

* * *

MORECAMBE AND HEYSHAM B.C. (a) 12 flats, Trumacar Lane Estate. (b) Borough Surveyor, Town Hall, Morecambe and Heysham, Lancs. (c) £1. (e) Feb. 5.

* * *

NEWTON ABBOT U.C. (a) 42 houses, Buckland Estate. Contract No. 18. (b) Surveyor, 18 Devon Square. (c) 5 Gns. (d) Jan. 27.

* * *

NORFOLK C.C. (a) Adaptation of The Elms, Earsham, Nr. Bungay, as an aged persons' home. (b) County Architect, 27 Thorpe Road, Norwich. (e) Feb. 5.

* * *

N. IRELAND—GOVERNMENT OF NORTHERN IRELAND. (a) Alterations to provide new public office at Head Post Office, Royal Avenue, Belfast. (b) Ministry of Finance (Room 103), Law Courts Buildings, May Street, Belfast. (c) £3. (e) Feb. 12.

* * *

NOTTINGHAM C.C. (a) Secondary school at Hanslope Crescent, Bilborough. (b) City Engineer, Guildhall. (c) £2. (3) Feb. 1.

NORTH RIDING E.C. (a) New school, Eston, Nr. Middlesbrough. (b) Messrs. Horth & Andrews, Custom House Buildings, Whitefriargate, Hull. (e) Feb. 8.

* * *

NORTHUMBERLAND C.C. (a) Technical college at Ashington. (b) County Architect, County Hall, Newcastle-upon-Tyne, 1. (c) 5 Gns. (d) Jan. 31.

* * *

NOTTINGHAM C.C. (a) Toilet block at Nottingham and District Technical College, for the Governors. (b) City Engineer, Guildhall. (c) £2. (e) Feb. 9.

* * *

NOTTINGHAM C.C. (a) Temporary infants' school, Gainsford Crescent. (b) City Engineer, Guildhall. (c) £2. (e) Feb. 1.

* * *

PLYMOUTH C.C. (a) Primary School at Johnston Terrace. (b) Messrs. Louis de Soissons & Partners, 5 Portland Square, Plymouth. (c) 3 Gns. (d) Jan. 22.

* * *

PORTSMOUTH C.C. (a) War damage repairs at Marine Garage and Clubhouse, Broad Street. (b) City Architect, Municipal Offices, 1 Western Parade. (c) 2 Gns. (d) Jan. 22.

* * *

PRESTON C.C. (a) Junior section of Ribbleton Hall Primary School. (b) Borough Engineer, Municipal Building. (c) £2. (d) Jan. 29.

* * *

RINGWOOD AND FORDINGBRIDGE R.C. (a) Block of three-storey dwellings, 3 pairs of houses, with drainage and site work. (b) Frank Andrews, 45 High Street, Ringwood. (c) 2 Gns. (e) Feb. 5.

* * *

SALOP C.C. (a) (1) New dairy block at Shropshire Farm Institute, Baschurch, and (2) conversion of Cloverfield, Whitchurch, as an aged persons' home. (b) County Architect, Column House, London Road, Shrewsbury. (c) 2 Gns. each contract. (e) Feb. 20.

* * *

SHROPSHIRE E.C. (a) New wing at Haughton Hall Residential Special School, Shifnal. (b) Messrs. Hobbis & Hobbis, 36 Waterloo Street, Birmingham, 2. Immediately. (c) 2 Gns. (e) Feb. 6.

* * *

STAMFORD B.C. (a) 56 houses and a shop and construction of roads and sewers on Drift Road Estate. (b) Town Clerk, Town Hall. (d) Jan. 20.

* * *

STAVELEY U.C. (a) 22 houses on Inkersall Green Estate. Contract No. 8. (b) Engineer and Surveyor, Council Offices, Lowgates, Staveley. (c) 2 Gns. (e) Feb. 8th

* * *

TIPTON B.C. (a) 30 houses at Cupfields Avenue, Upper Church Lane Estate. (b) Housing Architect, Municipal Buildings. (c) 2 Gns. (e) Feb. 7.

WEST RIDING C.C. (a) Infants' school at Ilkley. (b) County Architect, "Bishopgarth," Westfield Road, Wakefield. (c) 2 Gns. (e) Feb. 26.

* * *

WEST RIDING C.C. (a) Erection of (1) junior and infants' school at Crow Nest, Brighouse. (2) first instalment of Airedale junior school, Castleford. (3) junior and infants' school at Sowerby Bridge. (4) first part of first instalment of secondary school at Colne Valley. (5) major extensions in completion of secondary school at Colley, Eccleshield. (b) County Architect, "Bishopgarth," Westfield Road, Wakefield. (c) 2 Gns. each contract. (e) March 5.

* * *

WEST RIDING C.C. (a) Primary school at Hightown, Cleckheaton. Primary school at Wrenthorpe, Stanley. (b) County Architect, "Bishopgarth," Westfield Road, Wakefield. (c) 2 Gns. each contract.

* * *

WOKINGHAM R.C. (a) 26 houses and 6 bungalows on Cricket Hill Estate, Finchampstead. (b) Eric G. V. Hives, 3 Cork Street, Reading. (c) 2 Gns. (e) Feb. 5.

PLACED

Notes on contracts placed state locality and authority in bold type with (1) type of work, (2) site, (3) name of contractor and address, (4) amount of tender or estimate. † denotes that work may not start pending final acceptance, or obtaining of licence, or modification of tenders, etc.

BUILDING

DUNBARTONSHIRE. WAR DEPT. (1) Misc. work. (3) Leslie Kirk (1945) Ltd., Glasgow.

* * *

DEVON. WAR DEPT. (1) Misc. work. (3) J. Kerswill & Sons Ltd., Tavistock.

* * *

DYMCHURCH. KENT RIVER BOARD. (1) Reconstruction of Marshland sluice, bridge and tidal basin. (3) Aubrey Watson Ltd. (4) £28,737. Subject to M.o.H. approval.

* * *

DURHAM. M.o.W. (1) Erection of Relay Television Station. (2) Pontop Pike. (3) Geo. McCall Ltd., "Kirkside," New Harrington, Co. Durham.

* * *

ESSEX. WAR DEPT. (1) Bldg. work. (3) Carter & Ward, Wickford, Essex.

* * *

MIDDLESEX. WAR DEPT. (1) Misc. work. (3) Phillips & Cooper Ltd., Stanmore, Middlesex.

* * *

SURREY. WAR DEPT. (1) Misc. work. (3) F. W. Honour & Son Ltd., East Grinstead.

* * *

SUSSEX. M.o.W. (1) Erection of Automatic Telephone Exchange. (2) Mayfield. (3) E. Godwin & Sons, 34 Sackville Road, Bexhill.

WORCESTERSHIRE. M.o.W. (1) Repairs and alterations. (2) M.N.I., Scotland House, Stourbridge. (3) Cornelius Green & Porter, Hagley Road, Stourbridge.

PAINTING

BUCKINGHAMSHIRE. M.o.W. (1) Internal and external decorations. (2) N.S.H.C., Hostel, Cippenham, Slough. (3) Wm. Hartley & Sons, Wexham, Slough.

* * *

CHESHIRE. WAR DEPT. (1) Painting. (3) J. Lightfoot & Son, Chester.

* * *

CHESHIRE. WAR DEPT. (1) Painting. (3) N. S. Long Ltd., Poulton-le-Fylde, Lancs.

* * *

NORTHUMBERLAND. WAR DEPT. (1) Painting. (3) D. Humberstone & Co., Lough, Lincs.

MISCELLANEOUS

BERKSHIRE. WAR DEPT. (1) Flooring, etc. (3) Geo. Linnecor & Son Ltd., Birmingham, 6.

* * *

MIDDLESEX. WAR DEPT. (1) Restoration of stonework. (3) Szerelmey Ltd., London, S.E.16.

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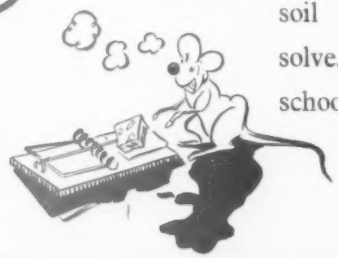

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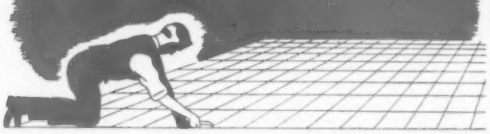

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OFFICIAL ANNOUNCEMENTS

APPOINTMENTS, CONTRACTS, TENDERS, SITUATIONS VACANT AND WANTED, FOR SALE, MISCELLANEOUS

RATE: 1/6d. per line, minimum 3/- average line 6 words. Each paragraph charged separately.

BOX NOS. add 6 words plus 1/- for registration and forwarding replies.

PRESS DAY Monday. Remittances payable to Iliffe & Sons Ltd., Dorset House, Stamford St., London, S.E.1.

No responsibility accepted for errors.

APPOINTMENTS

LONDON COUNTY COUNCIL.

APPLICATIONS are invited for positions of ARCHITECTURAL ASSISTANT (salaries up to £580 a year) in the Housing and Valuation Department. Commencing salaries will be determined according to qualifications and experience. Engagement will be subject to the Local Government Superannuation Acts, and successful candidates will be eligible for consideration for appointment to the permanent staff on the occurrence of vacancies.

Successful candidates will be required to assist in the design, layout and preparation of working drawings for housing schemes (cottages and multi-storey flats) and will be employed in the Housing Architect's Division.

Forms of application may be obtained from the Director of Housing, The County Hall, Westminster Bridge, S.E.1 (stamped addressed envelope required and quote reference A.A.1). Canvassing disqualifies. (816). [0101

ARCHITECTURAL ASSISTANTS urgently required. Qualifications: At least three years' Architectural training and, preferably, some experience in an Architect's office. Ability to carry out under supervision working drawings of smaller works from prepared sketch plans, and elevations. Knowledge of subsidiary duties common to an Architect's office. Some testimonies already accepted and/or in a position to sit for the Intermediate Examination of the Royal Institute of British Architects.

The commencing salary at age 21 years is £283 per annum rising to a maximum of £495 per annum. Entering salary is increased by £20 per annum for each year of age above 21 years, subject to a maximum commencing salary of £420 per annum. The posts are in Cambridge. Although these posts are not established appointments, some of them have long term possibilities and competitions are held periodically to fill established vacancies.

Apply to Ministry of Works (R.D.I. Establishment), Block "A," Brooklands Avenue, Cambridge. [5138

BERKSHIRE COUNTY COUNCIL.

APPLICATIONS are invited for the following appointments in the County Architect's Department:—

(a) ASSISTANT QUANTITY SURVEYOR. Salary, Grade VII-VIII. £635-£760.

Candidates should have passed the Final Examination of the Royal Institution of Chartered Surveyors in the Quantities Sub-Division and should have had considerable experience in taking-off in accordance with the Standard Method of Measurement and the settlement of accounts for all classes of building work.

(b) ASSISTANT QUANTITY SURVEYOR. Salary, Grade IV. £480-£525.

Candidates should have had experience in the settlement of accounts and the measurement of work in progress, and should, preferably, be capable of taking-off sections of major building projects.

(c) ASSISTANT HEATING AND VENTILATING ENGINEER. Salary, Grade VI. £595-£660.

Candidates should be Associate Members of the Institution of Heating and Ventilating Engineers, and have had a wide experience in the design and supervision of heating, hot water supply and electrical installations.

Application forms and further particulars can be obtained from the County Architect, Wilton House, Parkside Road, Reading, to whom they should be returned completed by noon on Thursday, 1st February, 1951.

H. J. C. NEOBARD, Clerk of the Council.
Shire Hall, Reading.
January, 1951. [5152

WAR DEPARTMENT.

APPLICATIONS are invited for the following vacancies in the Fortifications and Works Directorate at Chessington, Surrey:—

1. ASSISTANT ARCHITECT.
Must be A.R.I.B.A. or Registered Architect by examination.

2. LEADING DRAUGHTSMEN (Architectural).
Must have had a recognised training with considerable experience in an Architect's office.

3. DRAUGHTSMEN (Architectural).
Must have had a recognised training and good experience in an Architect's office.

Candidates for all posts should be under 50 years of age. Salaries for the posts are:
Posts 1—£448-£720 per annum.
Posts 2—£470-£595 per annum.
Posts 3, £283-£495 per annum.

Starting salary will be fixed according to age, qualifications and experience. Annual increases are payable, subject to satisfactory service.

The posts are temporary but most of them have long-term possibilities and open competitions are held periodically to fill established posts.

The work is varied and interesting and good canteen facilities exist.

Apply in writing only, stating age, nationality and full details of qualifications and experience, to The War Office, (C.9.A.), Room 504, Hotel Victoria, Northumberland Avenue, London, W.C.2. [5156

THE LONDON COUNTY COUNCIL invites applications from ARCHITECTS in private practice for inclusion in a panel with a view to acting in a professional capacity for (a) reconstruction work at the Council's educational buildings, and (b) the erection of new schools. The works are urgent and will require immediate attention.

Applications should be forwarded to the Clerk of the Council (E.1), The County Hall, Westminster Bridge, S.E.1, not later than 17th February, 1951, and should be accompanied by a stamped addressed envelope and brief particulars of qualifications and experience. (16645). [5136

EAST RIDING OF YORKSHIRE COUNTY COUNCIL.

APPLICATIONS are invited for the appointment of an ASSISTANT ARCHITECT on the permanent staff of the County Architect's Department, in accordance with Grades V to VI of the A.P.T. Division of the National Scales.

The salary range is £520 to £660 and the successful applicant will be appointed to the grade appropriate to his qualifications and experience.

Applicants should have had satisfactory experience in the design and construction of modern buildings and preference will be given to those who have appropriate professional qualifications.

The appointment, which is terminable by one month's notice of either side, is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, stating age, training, qualifications and experience, with particulars of past and present appointments, with salaries, and accompanied by copies of three recent testimonials, must be received by the County Architect, County Hall, Beverley, not later than Friday, 26th January, 1951. Applicants should disclose relationship to any member or Senior Officer of the Council and canvassing will be a disqualification.

T. STEPHENSON, Clerk of the Council.
County Hall, Beverley. [5154

HIS MAJESTY'S COLONIAL SERVICE. NIGERIA.

APPLICATIONS are invited for the post of LECTURER in Architecture and Building Construction in the Technical Institute, Yaba, Nigeria. Candidates must possess the A.R.I.B.A. qualification. They should have had some experience in Design, Construction and Supervision of houses and Public Buildings. Previous teaching experience is desirable but not essential.

Under the direction of the Principal the successful candidate will be required to take charge of the Architectural and Building Section of the Institute, including the organisation of Courses of Instruction. Duties cover both day and evening sessions.

Post is permanent and pensionable subject to a period of probation. Salary (including expatriation pay) in the scale £660-£1,300 per annum according to qualifications and experience. A cost of living allowance is also payable. Free first class passages for officer and wife, and allowances for children's passages are provided. Generous home leave after eighteen months' tour. Income tax at local rates, which are much lower than in the United Kingdom. Forms of application may be obtained from the Director of Recruitment (Colonial Service), Sanctuary Buildings, Great Smith Street, London, S.W.1, quoting 27054/104/Tech. Closing date for receipt of applications, 17th February, 1951. [5155

COUNTY BOROUGH OF BURY.

ARCHITECTURAL ASSISTANT required in the Borough Engineer's Department. Salary not exceeding A.P.T. III (£450-£495) according to qualifications and experience.

The appointment is subject to superannuation and medical examination.

Applications, stating age, details of training, qualifications and experience, together with names and addresses of two persons to whom reference may be made, must reach me not later than 3rd February, 1951.

EDWARD S. SMITH, Town Clerk.
Town Hall, Bury.
10th January, 1951. [5153

CROWN AGENTS FOR THE COLONIES.

QUANTITY SURVEYOR required by the Nyasaland Government for one tour of 2 to 3 years. Salary £900 a year plus cost of living allowance up to £107 a year according to dependents. Outfit allowance £30. Gratuity equal to 10 per cent. of total salary drawn payable on satisfactory completion of service. Free passages. Liberal leave on full salary. Candidates should have had experience in a Quantity Surveyor's Office in taking off and working up Bills of Quantities, preparing certificates for interim payments and settlement of contracts accounts for lump sum and prime cost contracts.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting M.2662?/A on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. [5157

MUNICIPALITY OF SINGAPORE.

APPLICATIONS are invited for three appointments of ASSISTANT ARCHITECT & BUILDING SURVEYOR on the permanent staff of the Municipal Architect and Building Surveyor's Department, Singapore.

Qualifications: A.R.I.B.A., preferably with previous experience of Municipal Government or other Official Service. Knowledge of L.C.C. Building By-laws an advantage. Age 24 to 30 years.

Basic Salary Scale $500-$1,000 per month. Starting point between $500 and $660 according to age and experience. Graduated scale of allowances: e.g. on basic salary of $560 p.m. present allowances are: Expatriation $110 p.m. plus Cost of Living $192 p.m. for single man, or $246 for married man or $318 for married man with dependant family. One Malayan Dollar equals 2s. 4d. Thus a married man with family on basic salary of $560 p.m. would draw equivalent of £1,383 per annum.

Quarters with heavy furniture provided at 8 per cent. of salary or allowance in lieu. Initial engagement on three years' agreement. Eight months' leave after four years' service. Free medical attention. Passages paid including family (children under 17 years). Compulsory Provident Fund contribution 7½ per cent. of salary and Municipal Commissioners donate 7½ per cent. for ten years rising to 20 per cent. after twenty years' service.

Applications in duplicate with full personal and technical information and copies of three testimonials, to Messrs. Peirce & Williams (Agents to the Municipal Commissioners), 1 Victoria Street, London, S.W.1, before Monday, 5th February, 1951. [5159

HUYTON-WITH-ROBY URBAN DISTRICT COUNCIL.

APPLICATIONS are invited for the appointment of CHIEF ARCHITECTURAL ASSISTANT. Salary in accordance with A.P.T. Division, Grade VI (£595 x £20 x £20 x £25 - £660 per annum).

Applicants must have passed the Examination of the R.I.B.A. or be Registered Architects, and preference will be given to those who have experience, in a municipal office, in housing design, construction, and control of contractors.

The appointment is on the Council's established staff, and is subject to (1) The National Scheme of Conditions of Service, (2) the provisions of the Local Government Act, 1937, (3) the passing satisfactorily of a medical examination, and (4) one month's written notice on either side.

Housing accommodation, if required, will be made available to the successful applicant.

Applications, stating age, whether married or single, qualifications and experience, and accompanied by the names and addresses of two referees, must be received by me not later than 27th January, 1951. Canvassing will disqualify.

H. E. H. LAWTON,
Clerk of the Council.
Council Offices, Derby Road, Huyton. [5165

URBAN DISTRICT COUNCIL OF CORBY.

ASSISTANT ARCHITECT

APPLICATIONS are invited for the above appointment in the Department of the Engineer and Surveyor at a salary which will be in accordance with qualifications, training and experience, and will be as follows:—

(a) REGISTERED ARCHITECTS with six or more years' experience in an Architect's Office or at a School of Architecture—Grade Va, A.P.T. Division (£550-£610) or Grade VI, A.P.T. Division (£595-£660), according to qualifications and practical experience,

(b) REGISTERED ARCHITECTS with less than six years' experience in an Architect's Office or at a School of Architecture—Grade V, A.P.T. Division (£520-£570),

(c) ARCHITECTURAL ASSISTANTS of not less than two years' experience in an Architect's Office (exclusive of pupilage or attendance at a School of Architecture)—Grade IV, A.P.T. Division (£480-£525).

Candidates must have experience of the design of buildings, preparation of working drawings, building details and estimating.

Housing accommodation will be made available to the successful candidate, if married.

The provisions of the Local Government Superannuation Act, 1937, will apply.

Forms of application can be obtained from the undersigned, to whom they must be returned, when completed, by not later than noon on Friday, the 2nd February, 1951.

G. B. BLACKALL, Clerk of the Council,
Council Offices, Corby, Northants.
12th January, 1951. [5161

GOVERNMENT OF NORTHERN IRELAND.

MINISTRY OF HEALTH AND LOCAL GOVERNMENT.

TECHNICAL STAFF—HOUSING AND PLANNING.

APPLICATIONS are invited for unestablished posts of:—

(a) ASSISTANT ARCHITECT, Grade A (Planning): £700-£900 per annum.

(b) ASSISTANT ARCHITECT, Grade B (Housing): £500-£750 per annum.

(c) PLANNING ASSISTANT: £500-£750 per annum.

Commencing salary within the above ranges will be fixed according to qualifications and experience; a salary lower than £500 may be paid to a candidate under 26 years of age.

Qualifications: Candidates for (a) and (b) posts must be Registered Architects by examination. In addition, candidates for the Housing vacancy should have experience in up-to-date house design and lay-out.

Candidates for the Planning Assistant post must be either Registered Architects by examination, Corporate Members of the Institution of Civil Engineers or Associates of the Royal Institution of Chartered Surveyors.

In addition, applicants for Planning appointments must possess a recognised qualification in town planning or have good experience in town planning work.

Preference will be given to candidates who served with H.M. Forces during war-time, providing the Ministry is satisfied that such candidates can, or within a reasonable time will be able to discharge the duties efficiently.

Applications, giving date of birth, full particulars of qualifications and experience, stating the post applied for, with copies of two recent testimonials, should be sent without delay, to the Director of Establishments, Ministry of Finance, Stormont, Belfast. [5162

CROWN AGENTS FOR THE COLONIES.

QUANTITY SURVEYOR required by the Government of Kenya for the Public Works Department for one tour of four years in the first instance. Commencing salary according to age and experience in scale £655 rising to £1,140 a year.

Candidates with considerable experience could expect a commencing salary appreciably above the minimum. Outfit allowance £30. Gratuity on satisfactory completion of services. Free passages. Liberal leave on full salary. Candidates must be Chartered Quantity Surveyors.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting M.25532/A on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications, and will communicate only with applicants selected for further consideration. [5163

EDINBURGH COLLEGE OF ART.

SCHOOL OF ARCHITECTURE.

APPLICATIONS are invited for the post of ASSISTANT, Grade II (full-time) on the Teaching Staff of the College. Salary scale £450 - £20 - £700 per annum, commencing salary according to qualifications and experience.

Forms of application and conditions of appointment can be obtained from the Secretary, Edinburgh College of Art, Lauriston Place, Edinburgh, 3, and should be returned to him not later than 9th February, 1951. [5160

BOROUGH OF WIDNES.

APPOINTMENT OF DEPUTY BOROUGH ARCHITECT.

APPLICATIONS are invited for the appointment of DEPUTY BOROUGH ARCHITECT at a salary in accordance with A.P.T. Grade VIII of the National Scale of Salaries, commencing at £685 per annum.

Applicants, who should be not more than 40 years of age, must be Associates of the Royal Institute of British Architects, and have had considerable experience in Municipal Architectural work, including post-war housing, post-war schools and public buildings.

Applications, stating age, present and previous positions, technical training and qualifications (with dates) and concise particulars of experience, together with the names and addresses of three persons to whom reference may be made, must be delivered, endorsed "Deputy Borough Architect," to the undersigned on or before Saturday, 3rd February, 1951.

The appointment, which will be terminable by one month's notice on either side, is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. Canvassing will be a disqualification, and applicants must disclose any relationship to members of the Council.

FRANK HOWARTH, Town Clerk.
Town Hall, Widnes.
15th January, 1951. [5164

DENBIGHSHIRE COUNTY COUNCIL.

NEW TECHNICAL COLLEGE, WREXHAM.

APPOINTMENT OF CLERK OF WORKS.

APPLICATIONS are invited from qualified and experienced men for the above position. The appointment will be for the duration of the contract, the value of which is approximately £500,000, and will be subject to termination by one month's notice on either side, to expire at the end of a calendar month. The structure is principally of reinforced concrete and brickwork. Further information may be obtained from the Architect, Messrs. Saxon, Smith & Partners, 2 Stanley Street, Chester.

The salary payable will be between £12 to £15 per week according to qualifications and experience.

Applications, stating age, qualifications, experience, and date available to take up duties, accompanied by copies of two testimonials, should be sent to the undersigned not later than the 31st January, 1951.

W. E. BUFTON, Clerk of the County Council.
County Offices, Ruthin. [5167

LONDON COUNTY COUNCIL.

ARCHITECT'S DEPARTMENT.

APPLICATIONS are invited for positions of ARCHITECT, Grade III (£550-£700) and TECHNICAL ASSISTANT (up to £580) for work on new housing schools and other public buildings. The positions are superannuable. Candidates for Grade III positions should possess professional qualifications.—Application forms from the Architect (AR/P/S), The County Hall, Westminster Bridge, S.E.1, enclosing stamped addressed foolscap envelope. Canvassing disqualifies. (384). [0097

INSURANCE

ARCHITECTS' Indemnity Insurance effected. — Please write for Proposal Form to

E. J. SAXBY, Incorporated Insurance Broker, 17a Carfax, Horsham, Sussex. Tel. 990. [4980

ARCHITECTURAL APPOINTMENTS VACANT

ARCHITECTURAL Assistant, preferably qualified, required urgently in large general practice. Experience of commercial and industrial work important. Splendid opening for man with drive. — Apply, giving fullest particulars, to Box 7921, The Architect and Building News. [5140

JUNIOR Architectural Assistant required for Architect's office in London (W.1 area). Interesting work. Progressive appointment offered to keen individual. Salary according to experience.—Write, stating age, training and experience, to Box 7987, The Architect and Building News. [5151

QUALIFIED Assistant Architect required. Must be good Draughtsman and experienced in both working drawings and sketch plans.—Apply, stating age, experience and salary required, to T. P. Bennett & Son, 43 Bloomsbury Square, London, W.C.1. [5137

SITUATIONS VACANT

ARCHITECTURAL Draughtsman required immediately. Interesting work. 5-day week.—Apply in writing, stating age and experience, to the Austin Motor Co. Ltd., Longbridge, Birmingham. (Personnel Dept.). [5158

BUILDING Draughtsman required; experienced in detailing and with good knowledge of Building Construction. This post is progressive and in the London area. Five-day week and pension scheme in operation.—Write, giving full details, to Box A.B.463, at 191 Gresham House, E.C.2. [5134

ESTIMATOR Designer for Concrete Floors in S.W. London area, required by established Company. Must be up-to-date in estimating and design and preferably with practical experience in organising and controlling contracts. Excellent prospects for right man.—Write, giving full particulars in confidence, salary, etc., to Box 7980, The Architect and Building News. [5148

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STUDENT R.I.B.A., preparing for Final examination, will require in July situation in progressive office. All replies answered.—Box 8097, The Architect and Building News. [5166

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PARQUET AND WOOD FLOORS Laid and Polished, Old Floors Repaired, Sanded and Polished. Keen prices. Fitted estimates with a guarantee of first class workmanship.—Parquet and Wood Floor Renovators, 9, Railway Approach, London Bridge, S.E.1. Hop. 1581. [5122

THATCHING and Reedlaying Contracts undertaken by Experts.—J. G. Cowell, Soham, Ely, Cambs. [5120

COMPETITION

ARCHITECTURAL COMPETITION.

A FESTIVAL HALL AT HESWALL FOR THE WIRRAL URBAN DISTRICT COUNCIL.

THE Wirral Urban District Council invite Architects to submit designs in Competition for a Festival Hall to be erected at Heswall, Wirral, Cheshire.

Assessor: Mr. P. Garland Fairhurst, M.A., F.R.I.B.A.

Premiums: £500, £350, £250.

Last day for submitting designs: 28th April, 1951.

Last day for submitting questions: 6th February, 1951.

Conditions may be obtained on application to:

WM. F. ROBERTS,
Clerk of the Council.

Council Offices, Heswall, Wirral, Cheshire.
Deposit: £2 2s. 0d. [5115

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"DOHM Vermiculite"—Featherweight Insulating Aggregate for concrete, plaster and loose fill. Dohm Ltd., 167 Victoria Street, London, S.W.1. [0105

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